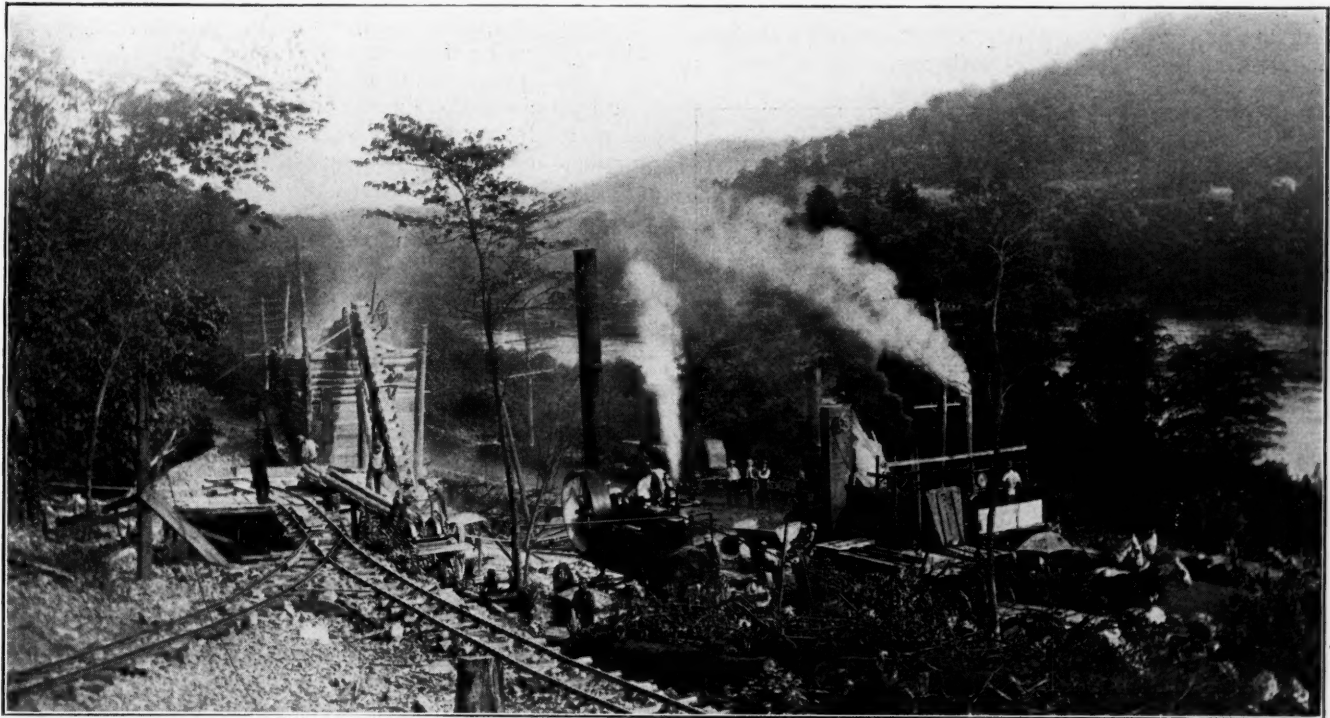


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GENERAL VIEW OF PLANT FOR LEWISTOWN NARROWS WORK.
Taken From Quarry. Crusher and Bins in Background, Mixing Plant in Right Foreground.

PENNSYLVANIA STATE HIGHWAYS

Organization of Department—Relocation and Reconstruction of Lewistown Narrows Road—Laying Asphaltic Concrete Surface—Reconstruction Problems—Work Near Philadelphia and Harrisburg.

Among state highway departments, that of Pennsylvania is one of the youngest and it covers one of the widest fields. Organized in its present form by an act of the 1911 legislature, known as the Sproul act, it assumed charge in June, 1912, of 9,000 miles of roads which comprised 296 specified routes. These roads form connecting links between county seats and principal cities and towns and in addition four trunk lines from one end of the state to the other. Moreover, the department is charged with the improvement of township roads by state-aid. Preliminary to construction, the responsibility for surveying and mapping by counties was imposed on it.

The organization of the department consists of a commissioner and two deputies and a central office force of auditor, statistician and chief clerk. A chief engineer is at the head of the engineering department. There are fifteen assistant engineers in charge of districts, each consisting of several counties, who are mostly concerned with new construction. There is a maintenance engineer and his assistant who have charge of various field corps. These field corps are under the direct charge of county

highway superintendents, of whom there are 52. At the central office is a chief draughtsman. There is also a special engineer in charge of bridges.

The officials at present are as follows: Commissioner, Edward M. Bigelow; deputies, J. W. Hunter and E. A. Jones; statistician, W. R. D. Hall; chief engineer, S. D. Foster; assistant engineer, P. M. Tebbs; maintenance engineer, G. H. Biles; engineer of experimental department, Thos. J. Keane; assistant engineer in charge of districts,—1, W. D. Meyers; 2, A. B. Gray; 3, A. S. Clay; 4, H. W. Claybaugh; 5, G. C. Langenheim; 6, E. S. Frey; 7, W. F. Cressman; 9, C. W. Hardt; 10, S. W. Jackson; 11, C. S. Lemon; 12, J. I. Riegel; 13, L. L. Robbins; 14, O. K. Taylor; 15, W. A. Wynn.

During the period between June 1, 1911, and June 1, 1915, the total appropriation and funds available amounted to \$12,764,766. Of this amount \$8,765,234 has been spent. Among the larger items are \$3,724,465 for construction and \$2,858,015 for maintenance. An item of exceptional interest is a charge of \$288,813 for machinery, tools and equipment. These include 21 steam boilers, 8 carts, 3 concrete mixers, 21 crushers, 1 asphalt mixing plant, 13 motor trucks, 62 road machines, 40 road rollers,

23 scarifiers, 44 sprinklers, 122 wagons and 7 asphalt heating tanks.

LEWISTOWN NARROWS.

One of the most important stretches of state work so far undertaken in Pennsylvania is the Lewistown Narrows, a road running along the base of a mountain along the banks of the Juniata river from Mifflintown to Lewistown, a distance of about eleven miles. Beginning at Mifflintown the road runs over a fairly open hilly country for a mile or two. From there the mountain pass begins. Originally the road was a mere wagon trail skirting the base of the mountain, close to the river, below high water level. The new work consisted in relocating

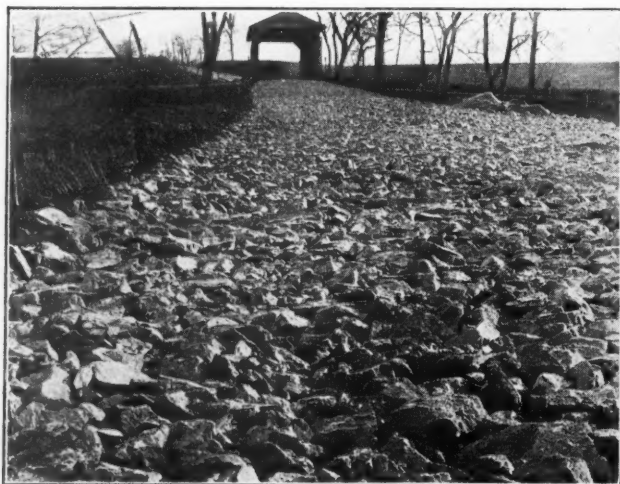


WATER COMING THROUGH RIPRAPPED BANK.

the road, for the most part by changing its elevation ten or twenty feet, moving the line closer to the mountain and constructing a paved roadway.

There are some moderate changes in grade, but the general profile of the road is level, the Lewistown end being only ten feet higher than the Mifflintown end. For the most part the foundation is good except for water. The mountain is made up of strata, considerably broken and disturbed, of ganister, a rock made up of varying amounts of argillaceous and silicious elements, resembling in appearance granite except for the absence of the black horn blend. Nearly all fills, therefore, contained a large proportion of rock.

If the materials of the foundation are good, the conditions so far as water is concerned could hardly be worse. Large quantities of water come down from the mountains, both on the surface and underneath. Springs in the roadbed were frequently met. So far as road building materials are concerned, the location afforded splendid road building stone but nothing else. There are no sand banks and the sand in the river is not fit to use in concrete as it carries a large amount of fine particles of coal. Climatic conditions are rather severe and the ground freezes to a considerable depth in winter. The



SHOWING NATURE OF TELFORD FOUNDATION.

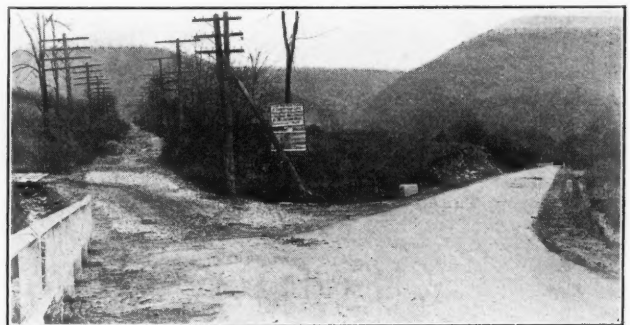
nature of the traffic to be expected consists of heavy automobile traffic, as it is the best road running through the mountains connecting the eastern and western parts of the state. Such local traffic as existed or would develop between two towns of four and eight thousand population also had to be provided for.

The surveys for the road were among the first made by the highway department. A width of two or three hundred feet was surveyed in places to supply data for making the location.

The general design of the roadway is a 16-foot asphaltic concrete roadway with shoulders of four feet on the filled side and a ditch on the side towards the mountain. In addition to the culverts leading from this ditch to the low land along the river, were many French drains. One of these drains was five feet wide and three feet deep. Small stone drains were put in at intervals of fifty or one hundred feet.

Contracts for the construction were let in two sections. The section of about four miles at the Lewistown end was let to the United Ice & Coal Company, of Harrisburg, Pa. This section was finished about a year ago. The contractor set up his crusher, a Champion 4½, and his asphalt plant in the same place. Stone was crushed fine enough so that no sand was needed. His transportation equipment consisted of 20 Koppel cars with a mile of track, 18 Eagle dump wagons, a Frick traction engine and some carts. The asphalt used was Texaco.

The large section was let to J. E. Francis, Punxsutawney, Pa., consisting of seven miles of roadway beginning at the town line of Mifflintown. Of this work two miles



RELOCATION, LEWISTOWN NARROWS.

were finished in 1912. In April of this year the plant was moved to a new location, additional machinery installed, and excellent progress made. Five miles of roadway were built between May 1 and October 31.

The excavation consisted mostly of removing rock and earth from the side of the mountain and depositing it on the lower side of the road. A Marion revolving shovel did the bulk of this work. There were fills, however, made for the whole width of the roadway, and some cuts. Sub-drains were a source of much trouble in preparing the foundation. Soft spots and springs were developed in rolling and where found had to be taken care of by stone drains. The construction of these necessarily interfered with the transportation equipment.

A substantial telford base eight inches thick was laid throughout. The specifications required stones of a depth of 6 to 8 inches, a width of not more than 6 inches nor less than 2 inches and a length of from 6 to 18 inches. They were laid by hand, with broadest edges down, lengthwise across the axis of the road. Stones were wedged into the open spaces and projecting points broken off with hammers. This rubble pavement was rolled with a ten-ton roller. As an additional precaution, in order to make a foundation that would stand the unusual conditions as regards water, two inches of macadam was spread over the telford and rolled, making a

ten-inch stone base—a pretty substantial pavement in itself.

The telford was obtained from quarries along the road and transported in Koppel cars. A team of horses moved six cars in a train, no trouble being experienced, after a little extra help was given in starting.

The specifications for asphaltic concrete required the following proportions: Crushed stone (run of crusher through $1\frac{1}{2}$ -inch screen), 53 to 62 parts; sand, 30 to 37 parts, and asphaltic cement, 8 to 10 parts. This was spread to a depth of $2\frac{1}{2}$ inches after compression. A seal coat of bitumen and stone chips was spread over the surface.

The plant used on this work is interesting on account of its excellent design and the unusual circumstance that rock was ground into sand to supply the finer part of the aggregate. Two locations were used, one by which the two miles of work laid in 1912 was done, and the second, an improved plant, set in about the centre of the five-mile section built this year. The site chosen for the latter was on the hill side of the road where the slope was moderate enough to allow suitable floor space for the machines and sufficient to permit the transportation of stone from one place to another by gravity.

Stone was quarried on the slope above and to one side of the mixing and crushing machinery. Two car tracks were laid to the face of the quarries, on which Koppel cars ran by gravity to the crusher; two hoisting engines and cables carried the empty cars back. The tracks and switches were so arranged that cars of telford were sent direct to the track laid along the road. There were two crushers, a Champion and a Wheeling, which were close together, but set with their driving belts at right angles. The boiler and engine running the Champion is shown in the illustration. The Wheeling crusher was run by a Farquahar traction engine and is too far in the background directly up the hill to show in the photograph. Each crusher had its own elevator carrying the crushed stone up to the screen above the bin. The Wheeling was used for crushing the stone to sand size, making about 30 tons per day when so used. The jaws could also be opened up to crush larger sizes when desired. The Champion handled about 140 tons of material per day.

Stone from the bin was delivered into two Koppel cars, a measured quantity of fine material in one car and of coarse stone in the other. These two carloads constituted the aggregate for one batch of bituminous concrete, which was mixed in a Warren portable mixing plant. The cars ran by gravity from the crusher to the elevator boot of the mixing plant. The whole outfit provided a plant of remarkable convenience and economy, considering the materials that had to be handled. From the mixing plant the hot mixed material was delivered into National bottom-dumping wagons and hauled to the work. The rolling was done with a Kelley-Springfield roller.

As this contract was a large one, a brief inventory of the contractor's plant and machinery is interesting. It is as follows: A Marion revolving shovel, 36 $1\frac{1}{2}$ -yard Koppel cars, 2 miles of track, 3 Farquahar traction engines, 3 rollers, a Monarch, Kelly and Buffalo-Pitts, Koehring and Eclipse concrete mixers for culverts, etc., Champion $4\frac{1}{2}$ portable crusher and revolving screen, No. 3 force feed fine crusher made by Wheeling Foundry Co., Champion road machine, 2 Ingersoll-Rand and one Wood drills, 15 $1\frac{1}{2}$ -yard and five 2-yard National bottom dumping wagons made by the Good Roads Machinery Co., 12 1-3-cu. yd. Western wheel scrapers, Warren portable asphalt plant.

SOME PROBLEMS SOLVED.

Several problems of relocation and reconstruction in the Lewistown Narrows road are worth mentioning.

Nearly the whole road was changed, the roadbed being raised and moved in towards the hill. One of the illustration shows the beginning of a relocation in which the new road was carried close to the river in order to avoid a hill of about 50 feet elevation over which the old road passed. The relocated road is 5,700 feet in length and is about 200 feet at the farthest point from the old road. The gain in the relocation was a saving in cost of construction and easier traction, the new road being practically level.

The picture showing a farm house close to the side of the road, illustrates a problem of the Lewistown Narrows road (and often met elsewhere). Farm houses are generally built on the summit of little hills, and where they are close to the road and the road is cut down (as it undoubtedly would be if there were no building near it), a retaining wall would have to be built in front of



PROBLEM IN GRADING HUMP.

the house, and in the specific instance illustrated in front of the barn on the opposite side, and expensive approaches constructed. In this case the summit was cut about two feet and no retaining wall built.

Another interesting problem in relocation involved questions of the relations of different subdivisions of the state having to do with road matters. At the foot of a short steep hill was an old bridge that really ought to be replaced. On the other side of the stream was low-level land and a fill. It was desirable to cut the hill, build a new bridge at a higher level and raise the fill across the low land still more. However, the county would not pay a fair share of the cost of a new bridge so that the grades had to be humored to meet existing conditions and save about five thousand dollars. The descent to the bridge on one side is about 78 feet long with a 6 per cent grade.

WORK NEAR PHILADELPHIA.

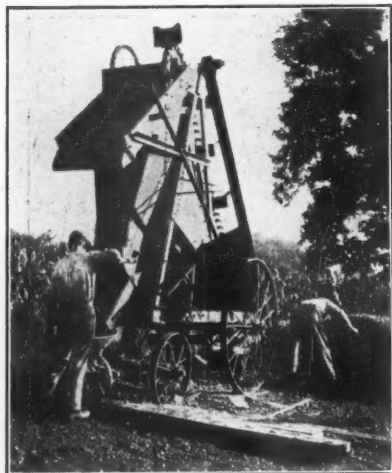
District No. 5, Warren F. Cressman, engineer, is a large one including the four counties of Philadelphia, Montgomery, Bucks, Chester and Delaware. Typical examples of the kind of roads built by the Highway Department are found here, either under construction or recently finished.

The Beth-Ayres road in Moreland township, Mont-



SHOWING TELFORD GUTTER. BETH-AYRES ROAD.

gomery county, is one of the most interesting ones. Concrete was selected for this road because it leads over a marsh, which is overflowed by water at times, and it is expected that the new road will be covered during occasional floods. The concrete is 5 inches thick, made of a 1:2:4 mixture, laid continuously without any provision for expansion joints, the idea being that cracks would develop in time and answer the purpose of specially made joints. The road is $2\frac{3}{4}$ miles long and cost about \$50,000. The roadway is 16 feet wide and the forms 7 feet wide. The contractors, Field, Barker & Underwood, of Philadelphia, used quite an extensive plant. A Thew steam shovel was used in making the one deep cut on the job. Most of the coarse aggregate was crushed stone $\frac{3}{4}$ size, though some gravel was used. The stone and sand were hauled from cars by teams and motor trucks. The concrete mixer used was a Smith.



FILLING WHEELBARROWS WITH
GASOLINE LOADING MACHINE.

A decided novelty in concrete laying was the use of a Link-Belt portable loading machine to load wheelbarrows for delivery into the mixer. In a concrete gang, as every contractor knows, the men on the wheelbarrows give out first on a hot day; hence the advantage of the machine. The engineers and others connected with the work say it is a good thing. In spreading the Tar-

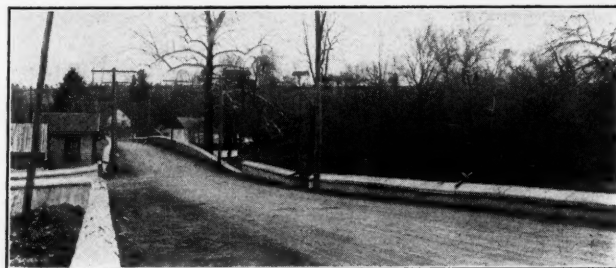
via on the finished surface an automobile distributing machine was used which covered eight feet of roadway at each trip, spreading it at the rate of $\frac{1}{4}$ gallon per sq. yd.

This road presents an exceptionally even surface to traffic. Concrete can be laid to more accurate grades than any material finished with a heavy steam roller. Moreover, the surface of Tarvia and clean chips or grit is about the most desirable in forming a non-slippery surface that has ever been devised. Perhaps much of the evenness of this job is due to the use of the mechanical distributor. Of course $\frac{1}{4}$ inch of bituminous material or thereabouts cannot be expected to wear as long as two inches.

Several penetration macadam roads in Bucks and Chester counties afford excellent opportunities to study



CRUSHER OWNED BY MAINTENANCE DEPARTMENT.



CONCRETE RETAINING WALL.

the general methods of construction and many interesting details of structures incidental to road work. Those who are familiar with paving work in cities only will readily see that a new class of problems has arisen and that various ways of meeting them have been devised.

The Emilie-Falsington road, Bristol and Falls township, is a $3\frac{1}{2}$ -mile stretch of penetration macadam, built by the J. F. Shanley Co. The use of telford approaches in intersecting roads may be noted here as elsewhere. This is a general custom of the department, and is adopted for all approaching roads no matter how small.

Old York road, from Warminster to Buckingham, runs through three townships and is $8\frac{1}{2}$ miles long. In this work local materials were used, red shale for the base and limestone for the top. The Union Paving Co., of Philadelphia, are the contractors. They crushed the limestone with a portable Champion crusher moved from one quarry to another along the road. The gutters on the steep grades are paved with telford or cobble to prevent washouts—a system which is general on all roads. The illustration shows retaining walls at the sides of an approach to a bridge. Comparatively few concrete walls are needed in this district.

The Paoli-West Chester road is a stretch 8.2 miles long running from West Chester through East and West Goshen and Willistown to Paoli. This road was built by force account, or cost plus a percentage. The McNichol Paving & Construction Company were the contractors. This road is notable for the long, straight stretches; in fact the whole road is nearly straight.

Near this road is a crushing plant and storage yard of the maintenance department. With this as headquarters a macadam road two miles long was resurfaced by the direct employment of labor under the supervision of the county superintendent. The plant consists of a $4\frac{1}{2}$ Champion crusher, screen and storage bin; a platform approach for the team drawing the rock from a quarry near by; steam rollers, wagons and supplies. Corrugated culverts, which are used mostly on maintenance work, are stored here also.

The Media-Wawa road is a $3\frac{1}{2}$ -mile bituminous macadam built by Stier and March, contractors, Philadelphia. The interesting feature of this road is a hill where much water and quicksand were encountered. A tile drain was laid along the center of the road with branches fifty feet apart extending alternately to the sides of the road.

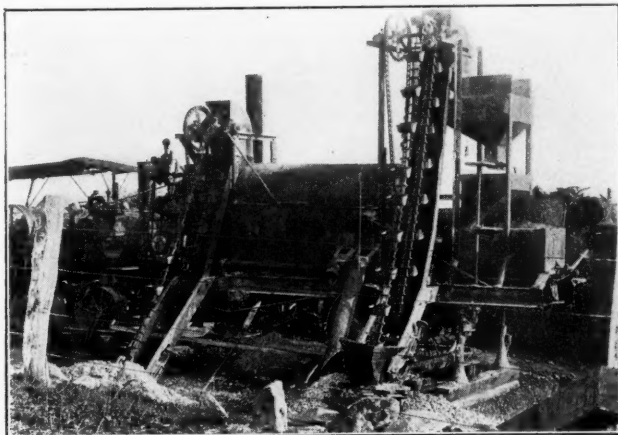
On the Baltimore Pike, in the town of Swarthmore, is a section of $1\frac{3}{4}$ miles of bituminous concrete, mixing method, which was built by the maintenance department by direct employment of labor, using their own plant. The plant was designed by Thos. J. Keane. It consists of a Ruggles-Coles dryer, storage bin for hot stone, Iroquois mixer and two melting tanks. The road was an old macadam with telford base, badly worn. The surface was leveled up with stone and two inches of bituminous concrete laid over it.

On the Cooperstown road, Haverford township, Delaware county, is a stretch of one mile of Amiesite resurfacing built by Palmer & Snyder, of Wallingford,

RECENT WORK NEAR HARRISBURG.

Much of the work being done by the State Highway Department consists of bituminous concrete and bituminous macadam penetration. Examples of both kinds of construction and their action under traffic can be seen in the vicinity of Harrisburg. One of these is a four-mile stretch of the River road beginning at the city line, where bituminous concrete was laid. This road is subject to suburban traffic and much pleasure riding in addition to the ordinary traffic of a country road. The bituminous concrete was laid on a cement concrete foundation and there is a 12-inch concrete curb along the sides flush with the asphalt, forming, in fact, a part of the roadway, which is 16 feet wide. The curbing was made unusually wide to protect the pavement from much cross traffic which was anticipated. It seems to be effective. This stretch of pavement was accurately laid and conforms to the highest standards of this style of construction in all respects.

On the other side of the river, a few miles from the city, is a section of bituminous macadam penetration. It is of interest chiefly because it was built by the maintenance department by the direct employment of labor. This method allows a certain latitude in construction not possible in contract work. If the authorities in charge think best they may use more materials than the



MIXING PLANT ON LANCASTER CO. STATE AID WORK.

specifications require and the community benefits by better work, if the judgment of the authorities is sound. Or less material may be used where it is believed that conditions permit, and the expense of a literal following of specifications may be reduced. In the instances under consideration, a very liberal application of asphalt was given—over two gallons to the square yard. The result is that there is an absolutely unbroken surface to the roadway and it requires very close examination for anyone to tell whether this is a penetration macadam or a mixed concrete job. However, it was stated that in summer there had been some exudation of bitumen and some stone chips had been rolled into it in places to take this up.

Three uncompleted contracts in the vicinity of Lancaster illustrate prevailing types of construction under state aid. Lancaster county is a rolling prairie county, having a rich soil underlaid by limestone strata. The county is reported by the Census Bureau as the richest farming county in the United States. Limestone occurs so commonly that nearly all the farmers dig it up on their farms and burn it for lime to put on the fields. Limestone is naturally the material of which the roads are constructed. Good farm land does not make good roads, and the roads are hardly what would be expected in a prosperous community. There are, however, a good many turnpikes kept in good order by private companies.

The state aid roads are purely local roads, but not unimportant.

The general style of construction adopted is 16-foot roadways of penetration macadam with telford base. The base is the same as described above for the Lewistown Narrows road. The macadam layer is three inches thick made of stones passing a 2-inch circular opening and rejected by a $\frac{3}{4}$ -inch circular opening. Rolling is done by a ten-ton roller. Upon this surface is spread by pressure distributors or fan-spout sprinkling pots $1\frac{1}{2}$ gallons (in later contracts changed to $1\frac{3}{4}$) of bituminous materials, having a penetration of 110 to 115 at 77 degrees, Dow method. This is applied at a temperature of 350 degrees. Dustless screenings passing a 1-inch screen are spread in sufficient quantities to cover the road and take up the surplus bitumen. The road is rolled; then swept clean and $\frac{1}{2}$ gallon (in later contracts $\frac{3}{4}$) applied per square yard. Dustless stone chips as before are then added and the roadway given a final rolling.

The general character of the work on these three roads is the same, as the materials, except asphalt, are alike and the specifications and supervision are the same. In one instance the contractor obtained permission to lay bituminous concrete, mixing method, instead of penetration macadam at the same price. He is using a portable Iroquois plant for the work and is laying about 400 feet of 16-foot roadway a day with it. After the work is done it is practically impossible to distinguish the macadam from the concrete. It will in time afford a fine opportunity to compare the wearing qualities of the two pavements. This job is being done by John B. Shreiner, of Manheim. The road consists of nearly five miles from Lititz pike to Warwick township. The contractor gets the following prices: Excavation, 53 cts. per cu. yd.; telford, 56 cts. per sq. yd.; bituminous macadam, 80 cts. per sq. yd.; concrete in culverts, etc., \$6.95. The total estimated cost for the contract is \$63,598. Mexican asphalt supplied by the United States Asphalt Refining Company, is being used.

The Ambler-Davis Co., of Philadelphia, has somewhat less than two miles crossing the town of Warwick. Bermudez asphalt is being used on this work. The price for the work does not vary much from those given above.

George C. Souder, Lancaster, Pa., is building about $4\frac{1}{2}$ miles extending from a crossroad north of Warwick, following Newport road through Rothsville to Cocalico creek. Mexican asphalt, furnished by the Standard Oil Company, is the bitumen used.

CONVICTS FOR ROAD WORK.

Thirteen states passed laws during the present year allowing the use of convicts in the construction and repair of highways, according to a compilation by Dr. E. Stagg Whitin, assistant in social legislation in Columbia University, and chairman of the executive committee of the National Committee on Prison Labor. They are Arkansas, Delaware, Florida, Illinois, Indiana, Kansas, Maine, New Jersey, North Dakota, Pennsylvania, Vermont, West Virginia and Wisconsin. As many other states had previously passed similar legislation, but few of the 48 states have not seen the wisdom of using prisoners to build and maintain public roads.

The West Virginia law authorizes the county courts to make appropriations out of road funds for convicts' work; it states that the court shall sentence any male person over 16 to road work instead of to the county jail; persons charged with misdemeanors unable to furnish bail shall work on the roads, and, if acquitted when tried, shall be paid 50 cents a day for each day's work they perform; justices of the peace shall sentence to

work on the roads persons convicted of crime whom otherwise they would send to the county jail.

In Iowa, the Board of Control of State Institutions, with the advice of the warden of any penal institution, may permit able-bodied male prisoners to work on the roads. The law specifically states such labor shall not be leased to contractors. A prisoner opposed to such work, or whose character and disposition make it probable that he would attempt escape or be unruly, is not to be worked on the highways. Although the prisoners are under the jurisdiction of the warden while building or repairing roads, their work is supervised by the state highway commissioner. Prisoners employed on the highways of Iowa receive such part of their earnings, above the cost of their keep, as the board deems equitable, the earnings either being funded or given to their dependent families.

CONCRETE ROADS*

Present Condition of Wayne County Roads in Detail— Construction of Each and History of Maintenance —Effect of Subgrade Defects.

By FRANK F. ROGERS, State Highway Commissioner of Michigan.

Much of value has been written in the past two years on concrete roads and pavements; but a great deal is in the nature of theoretical discussions quite largely based on laboratory experiments. Hence, when an opportunity is offered to make a field study of many miles of concrete roads, some of which have seen four years of service, it should not be lost.

The writer makes no claim to being a concrete expert but simply has been fortunate in having the opportunity to study at first hand, and in some detail, the behavior of a large mileage of concrete roadways in Wayne county, Michigan. This county, without doubt, has a larger mileage of concrete roadways than any other county in the United States, or than is possessed by any equivalent area under a single local government in any foreign country. There are now completed in Wayne county about 65 miles of concrete highways outside the corporate limits of cities and villages. All of the main highways leading out of this city have been concreted to the outermost boundaries of Wayne county, and several cross-roads have already been concreted.

The State Highway Department, with the co-operation of the road officials of Wayne county, and assisted by Prof. John J. Cox, instructor in highway engineering at the University of Michigan, has just taken up some detailed and rather minute observations of these roads which will extend over a period of years, in the hope that after a while a safe estimate can be made of the probable life and cost of maintenance of such pavements as the county is now building and under such traffic, soil and climatic conditions as prevail in this locality.

The first work in this study will be careful traffic records covering enough time and at such frequent intervals as will give a reliable estimate of the average daily traffic for one year. The first records were taken for one continuous week, beginning August 21, and a part of this record will be used for the purpose of the present discussion.

The next step was to start a permanent record, showing the present condition of each 25-foot section (the distance between expansion joints) of all the different roads. The observations for this record were made September 2, 3 and 4 and cover 6,384 sections and a

little over 30 miles of road. Several pieces of road have not been taken at this time. The oldest roads were built in 1909, and the newest that were taken were built in 1912, having been down one year.

For the purpose of this record the defects in the slabs or sections have been classified as longitudinal, transverse and diagonal cracks, and holes. The records were taken in ordinary field books, the left-hand column of the left-hand page having been previously numbered with an automatic numbering stamp to designate the record number of each slab, while the four columns to the right were headed L, T, D, H, respectively, being the first letters of the words indicating the defects named. Opposite each number and in the proper column vertical, horizontal or diagonal marks were used for symbols to indicate the form of the crack, while small ovals were used to indicate such holes as seemed worthy of note. Tar had been spilled on many spots that were not defective.

Woodward Avenue Road.—The first mile of this road was built in May and June and opened to traffic in July of 1909, thus giving it full four years of wear. The traffic record of this road shows a daily average of 2,160 vehicles, of which 88.1 per cent were motor-driven.

The soil is clay loam, inclining a little more to sand at the northerly end. A double-track electric railway occupies the westerly side of the street. Between the railway and the concrete roadway is a very shallow gutter under which was laid a tile drain from 2 to 3 feet in depth. On the opposite side is an open ditch, the bottom of which is from 2 to 4 feet below the crown of the roadway.

The pavement is 18 feet wide, has a crown of 3 inches and a blind curb 8 inches wide and 4 inches deep under the outer edges which were somewhat beveled. The concrete was composed of Portland cement, crushed field stone or cobbles and sand mixed in the proportion of 1:2½:5 for the base, which was 4 inches thick. The top layer was made of the same materials, using a 1:2:3 mix, and was 2½ inches thick.

No very definite data can be secured to determine the wear, which seems to be slightly greater on the side opposite the railway, but measuring from some of the harder pieces of the coarse aggregate which have been worn but little, if any, we have estimated the general wear at about ¼ inch, which would be an average of 1/16 inch per year.

This mile was divided into sections of about 25 feet, separated by expansion joints, there being 209 sections to the mile. The most of the sections were separated by four thicknesses of tar paper separated by thin boards which it was planned to remove as the work progressed, though many of the boards are still in the pavement. Four of the joints were protected by pairs of steel angle bars, separated with tar paper and placed with one leg of each angle back to back so that the other leg of each bar was flush with the surface of the concrete, thus covering a space of about 4½ inches at the joints. The concrete wears slowly on each side of the angles, leaving a raised joint that is slightly noticeable when driving over the pavement. This was an experiment which has not been repeated.

Of the 209 sections constituting the first mile on Woodward avenue, 80 showed longitudinal cracks, 32 transverse cracks, and 2 diagonal cracks, while 46 sections were recorded as having holes, making a total of 160 sections which are more or less imperfect, or 76.5 per cent of the entire mile.

The remaining portion of Woodward avenue, 252 sections, was built in 1910, using the same materials and the same mix. No blind curb was used, and the crown

*Paper before American Road Congress, at Detroit, Mich.

was reduced to 2 inches. The soil on this section is considerably more sandy, especially toward the north end.

On this portion of Woodward avenue 29 sections have longitudinal, 22 sections transverse, and 6 sections diagonal cracks; 11 sections have holes, making a total of 68 defective sections, or 27+ per cent, as compared with 76+ per cent in the first mile.

Gratiot Avenue.—On Gratiot avenue in the season of 1910, 9,000 feet of 16-foot concrete roadway was built. On this pavement gravel and sand were used for the aggregate and a one-layer concrete, having a 1:2:4 mix, was laid. The soil is a clay loam and rather heavy. This road was not completed until late in the season and was opened to travel in November. It immediately pitted and looked rough and has been covered with a surface treatment of refined tar and fine gravel. It was re-covered this season, using a rather light grade of tar (Tarvia A) but it already shows some tendency to scale off. The experience in some other places leads the Commission to believe that a heavier grade of tar gives better results.

Beyond this portion of the roadway 326 sections of the same width concrete were laid in 1911, reaching to the county line. Washed pebbles and sand were used for the aggregate in a 1:1½:3 mix, one course concrete 7 inches deep being laid. The records for this piece are as follows: Longitudinal cracks, 11; transverse cracks, 10; diagonal cracks, 3; holes, 6; showing a total of only 30 defective slabs, or 9.2+ per cent. The traffic count on this road, taken at the county line, shows 507 vehicles daily, 65.8 per cent of which are motor-driven.

Grand River Avenue.—On the Grand River road 61 sections of two-course concrete, the same as laid in the first mile of Woodward avenue, were built in 1909. The soil is a clay loam. The records show 11 longitudinal cracks, 2 transverse cracks, 1 diagonal crack and 3 holes, a total of 17 defective slabs, or 27.9— per cent. The traffic count showed 1,064 vehicles, 56.5 per cent of which were motor cars.

In 1910, 341 more sections were added to Grand River avenue under contract, the specifications being the same as for the north end of Woodward avenue. Thirty-three of these slabs became more or less pitted, some having quite large holes. They have been repaired by covering with refined tar and stone chips, so that no defects could be observed at the time of the count; hence, only 308 are shown in the table. The defects noted are as follows: 59 longitudinal, 20 transverse, 29 diagonal cracks and 46 holes, a total of 154 defective slabs, or 50 per cent.

In 1911, 515 additional sections of one-course concrete were placed on the Grand River road. Washed pebbles and sand were used for the aggregate with a 1:1½:3 mix. The Baker steel joint was used in all of this work, except the first six sections. The defects noted are as follows: Longitudinal cracks, 8; transverse, 26; diagonal, 3; holes, 5; making a total of 42 defective sections, or 8.2+ per cent.

In 1912, 1,208 more sections were added to Grand River avenue, reaching to the line between Wayne and Oakland counties. The count on these sections shows as follows: 66 longitudinal cracks, 37 transverse cracks, 6 diagonal cracks and 5 holes, making a total of 114 defective sections, or 9.4+ per cent. The soil grew more sandy as the road extended westerly, considerable stretches being almost free from clay or loam.

Michigan Avenue.—On Michigan avenue 481 sections of concrete 17 feet 8 inches wide were laid, using washed pebbles and sand for the aggregate in a 1:2:4 mix.

The soil for the most part is a sandy loam, but a little heavy. The count shows as follows: 219 longitudinal cracks, 48 transverse cracks, 23 diagonal cracks, 21 holes, making a total of 311 defective sections, or 64.6+ per cent. The traffic count shows 1,009 vehicles, 67.5 per cent of which were motor-driven.

In 1911, 1,570 sections were added to this piece of road, using washed pebbles and sand for the aggregate, and a 1:1½:3 mix. The soil over which this pavement was laid is a sandy loam running into light sand at the west end. The count shows the following: 219 longitudinal cracks, 80 transverse cracks, 42 diagonal cracks, 14 holes, making a total of 355 defective sections, or 22.6+ per cent. In 1912, this road was paved to within ¼ miles of the county line, and this year completed to the county line, but no record was taken farther west than the east limits of the village of Wayne.

River Road.—In 1910, 149 sections of concrete 15 feet wide and 6½ inches deep were laid on the River Road, using gravel and sand for the aggregate and a 1:2:3 mix. The soil over which this road runs is for the most part heavy clay. The count shows as follows: 49 longitudinal cracks, 5 transverse cracks, 6 diagonal cracks and 2 holes, making a total of 62 defective sections, or 41.6+ per cent. The traffic count shows 538 vehicles daily, of which 78.9 per cent were motor-driven.

In 1911, 434 sections were added to this road some distance below the village of Trenton. The pavement was 15 feet wide, 7 inches thick, built of washed pebbles and sand for the aggregate, using a 1:1½:3 mix. The count for this stretch of road shows as follows: 165 longitudinal cracks, 17 transverse cracks, 13 diagonal cracks and no holes, a total of 195 defective sections, or 44.9+ per cent.

In 1912, the gap between this piece of road and the southerly limits of the village of Trenton was closed in with a similar pavement to that just described, comprising 213 sections. The count on this piece shows defects as follows: 14 longitudinal cracks, 8 transverse cracks, 4 diagonal cracks and no holes, making a total of 26 sections, or 12.2+ per cent.

The same year there was added to the south end of the work done in 1911 something over two miles of concrete roadway, but of this only 208 sections were counted. Of the sections counted, 17 show longitudinal cracks, 9 transverse cracks, no diagonal cracks and no holes, a total of 21 defective sections, or approximately 10 per cent. The soil of the entire road was heavy clay.

Fort Street Road.—In 1910, one-half mile of gravel concrete of a 1:2:4 mix, 12 feet wide and 6½ inches deep, was built on Fort street. This concrete, like that already referred to on Gratiot avenue, was built rather late in the season and was opened to traffic in November. It immediately pitted to such an extent that it has since been coated with refined tar and fine washed gravel, about ¼ inch in size. This covering makes an excellent surface and wears fairly well. Of course, it was impossible to observe any further defects in the concrete at this time. Continuing south, in 1912 450 sections of concrete 12 feet wide, 7 inches deep, and of 1:1½:3 mix were added. The count on this piece of road follows: Longitudinal cracks, none, although another observer has reported there are 2; transverse cracks, 19; diagonal cracks, 9; and holes, 1. Total defective sections, 29, or 6.5— per cent.

From the foregoing it is strikingly apparent that the percentage of defects varied greatly in the different roads. A careful study of this variation in connection with the age of the pavement will soon convince one that mere age has not produced the defects noted. For

example, 252 sections built on Woodward avenue in 1910 show but 27 per cent defective slabs, while 308 sections built on Grand River avenue, the same year under the same specifications, show 50 per cent of defective slabs. There are two noticeable differences. Grand River avenue was built by contract on a clay loam soil, while the portion of Woodward avenue named was built by day labor under the direct supervision of the engineers of the County Road Commission, on a soil more sandy and presumably with a little better sub-drainage. Again, 481 sections built on Michigan avenue the same year with sand and pebbles for the aggregate and a 1:2:4 mix show 64.6 per cent of defective slabs. This was on clay loam soil. We might also mention 149 sections built on the River Road in 1910 on heavy clay soil, under the specifications last named, which show but 41.6 per cent of defective slabs.

The most noticeable feature concerning these defects is that the longitudinal cracks almost always appear in groups, seldom singly. This indicates that there must be some local conditions in the foundation, due to insufficient drainage, soil conditions, newly-made fills or uncompacted sub-grades that cause these defects. Longitudinal cracks almost invariably appear on fills and on cuts, apparently with as much frequency in the latter as in the former. It would seem that cracks on the fills are due to the settlement of the embankment, and in the cuts to the presence of water and frost in the sub-grade. Briefly, the writer's opinion is that these cracks are due, first, to the settlement of the newly-made fills, and, second, to water that has not been completely removed from the sub-grade, plus frost. If these causes could be thoroughly eliminated, it would seem possible to build concrete roadways to the width of 15 or 16 feet, where sufficient expansion joints are used, without fear of trouble from longitudinal cracks.

It has been argued by the Morse-Warren Engineering Company, in a recent publication, that it is impossible to build concrete pavements (wider than 12 feet) which will remain free from longitudinal cracks without using longitudinal joints, unless the pavement is so thick as to make the price practically prohibitive. The 450 sections of 12-foot roadway on the Fort street road would seem to bear out this assertion, but a mile of concrete on the Eureka road, which the writer did not get time to inspect, shows a great number of longitudinal and transverse cracks in a 12-foot concrete roadway, where the soil conditions are the same as on the Fort street road referred to. The only apparent difference is that the former is a 1:2:4 mix and the latter a 1:1½:3 mix, washed pebbles and sand being used for the aggregate in both cases.

But long stretches of pavement 16 feet wide and now two years old on Grand River and Michigan avenues, which show no longitudinal cracks, would seem to prove that this statement is not necessarily true and that a sufficient amount of money spent in compacting and draining the foundation or in reinforcing the concrete over newly-made fills would produce pavements free from the objectionable longitudinal cracks, whether natural or artificial. Most persons are agreed that transverse cracks are almost always due to defective expansion joints. It has been thoroughly demonstrated, both theoretically and practically, that 25 feet is frequent enough for the expansion joints, and it is quite possible that they might be placed farther apart with safety—probably not less than 3 to 100 feet.

The diagonal cracks are doubtless due to causes which are a combination of those noted under longitudinal and transverse cracks. Many diagonal cracks were noted where the corners only were broken off, frequently on

adjoining corners of adjacent slabs, indicating that the slabs were united through the expansion joints with a bond stronger than the tensile strength of the concrete on either side of the joint.

The holes noted are perhaps of less importance than the different kinds of cracks. In a few instances they are rather large, sometimes a square yard or more in area, but such places are very rare and most of the holes noted are due simply to some foreign substances getting into the concrete, like clay, wood or some fragment of an inferior rock that might chance to be a part of the aggregate. This was more noticeable where crushed cobbles were used for the coarse aggregate than where washed pebbles were used.

Anyone familiar with the quality of rocks which constitute Michigan cobbles will understand that the principal objection to this material for an aggregate on concrete roads is the varying qualities of these rocks, ranging from soft to hard granite, quartzite and trap. A study of the roads where these materials have been used shows much more wear in the spots where the softer rocks happen to be at the surface.

Up to the present time the defects noted, except the pitted conditions of the concrete roads which have been re-surfaced in the manner already described, are not serious and are not causing any additional expense for upkeep. In the past two years the expansion joints on all the old work, whether reinforced or not, have been coated with refined tar and sand once a year. Thus far, the cost has ranged between \$50 and \$100 per mile, depending on the distance of the work from the base of supplies.

MOTOR TRUCK OIL SPRAYER.

The truck illustrated herewith was purchased by Los Angeles county in February, 1913, for use by the County Highway Commission as an oil spreader. It carries a tank which holds 1,083 gallons of oil. The truck is equipped with a Gardner-Rix 6x6 Model "H" air compressor. Power for operating the compressor is from the jack shaft extension from the transmission. The compressor is capable of producing sixty pounds pressure per square inch in the tank. The tank is covered with two inches of asbestos and is filled with oil at from four hundred to five hundred degrees F. There is an indicator on the dash board and another on the rear end of the tank so that the pressure may be controlled by either the driver of the truck or the operator on the rear end. The heat from the exhaust is distributed around the spreader teeth, thereby keeping them warm.



LOS ANGELES MOTOR OIL SPRAYER.

The discharge adjustment is so accurate that, in a test made by the county in which just enough oil was put into the tank to spread three-quarters of a gallon per square yard over a distance of one-half mile, they came within twenty feet of the finish when their oil was exhausted.

The truck cost \$4,750 and the total equipment, including all parts and labor, was \$1,585.

Up to the present time this truck has covered about seven thousand miles and has spread approximately one hundred and twenty-five thousand gallons of oil and no repairs have been necessary.

NEW YORK HIGHWAY ORGANIZATION

Scheme for Reorganization Adopted—Construction, Maintenance and Supervision Under Engineer—Work Divided Geographically Rather Than Functionally.

A board of consulting engineers comprising Harold Parker, George C. Diehl and Wm. de H. Washington has reported to John N. Carlisle, commissioner of highways of New York State, recommending a complete scheme for the reorganization of the highway department, which is estimated to save from \$300,000 to \$500,000 a year and at the same time increase the efficiency of the department.

In outlining its plan of organization this committee says:

"Responsibility must be so placed that it can not be shifted or avoided without detection, and that if any unit fails to respect its responsibilities it will be taken up automatically and discharged under emergency conditions until routine can be re-established."

The plan of reorganization suggested by the board places highway construction, maintenance, and the supervision of town highways under the direction of a chief engineer working under the commissioner as the administrative and executive head of the department. The chief engineer shall have two deputies, special residencies and clerks to handle the office work and any technical investigations that may be necessary. The two deputies each will be in charge of a specified portion of the state, the division to be made so as to place approximately the same amount of work on each of the two deputies.

The state is divided into nine divisions, each in charge of a division engineer. Each division engineer shall have in his office a resident engineer competent to act in his absence and to have special charge of surveys, plans, maps, designs, estimates, payments on contracts, etc. He shall also have a chief clerk to care for correspondence, files, preparation of vouchers, etc.

In the field work each division is divided into approximately seven sections with an assistant engineer in charge of each. While it is probable that in working out this part of the plan the sections will be co-ordinate with the county lines, that is not specially provided for and in some of the larger counties it may be necessary to have two section engineers.

Under the direction of each division engineer for the maintenance work there shall be three gangs with motor trucks, each gang to maintain approximately 150 miles of completed state and county highways. This plan of reorganization cuts down to a large extent the number of patrolmen and substitutes in their place a system of maintaining highways by the section gang system as followed on the railroads.

The report in part reads as follows: "Traffic census should be taken annually of each completed state and

county highway and of each highway for which plans and specifications are in course of preparation.

"Accurate reports should be kept of the original cost of each completed state and county highway, the annual expenditure for repairs, the cost of renewals, or in the present absence of such costs, an estimate of the life and of the annual amount properly chargeable to renewals and resurfacing should be made. Careful computation should be made to ascertain the annual cost per ton of traffic and per foot of width of each of the generally accepted types of construction to determine the most economical types for the future."

A considerable part of the report is devoted to the maintenance problem, and it is estimated by the board that the substitution of the gang system of maintenance over the present methods would effect a saving of \$700,000 a year and will prolong the life of the roads and keep them in better and more serviceable condition.

A system of reports is recommended so that each official in the department will know exactly what his subordinates are doing. The assistant engineer in charge of the section is to make a brief daily report, stating the contract work in progress, unusual details, weather conditions, surveys, maintenance work, number of men on various assignments, conferences with county officials, etc.; monthly reports showing in detail the quantity of work performed under each schedule of each contract in his section; cross section and survey notes to enable the division engineer to check quantities reported for compensation; and reports on proposed new work showing conditions under which the work must be performed. He must also make reports on rock quarries, gravel beds, and other sources of supply for construction material, and a monthly report showing maintenance work done, including state, county and town highways.

The assistant engineer in charge of survey party will report to the division engineer a daily statement of results accomplished and a monthly statement in time roll showing work accomplished.

The highway inspector on the road will make daily report covering work inspected, materials used, quantity of work completed, quality of workmanship and weather conditions.

The maintenance gang will make a duplicate daily report, one copy going to the division engineer, one copy to the assistant engineer, stating the work done, mileage traveled, material used, men employed and weather conditions.

The division engineer will make a series of reports to the chief engineer; one report summarizing the work of construction and others the work of maintenance, surveys, town highway work, work on maps and plans, also make progress charts for all contracts, forecast of requirements for the ensuing month on construction, maintenance, surveys, etc., reports on special problems, an annual report summarizing the work of his division and forecasting the work for the ensuing year, and special reports as required by conditions.

The test and research bureau, which is under the direction of the chief engineer, will make daily reports showing tests and researches made, with the results and monthly reports with recommendations.

The chief engineer will report monthly to the commissioner, summarizing the work done under his direction and going into details with all matters of the organization. The secretary and the auditor also make reports of the phases of their work. The commissioner is required to make a report every three months to the governor and annually to the legislature.

"The ever increasing use of public highways," the report reads, "especially by the motor vehicles traversing considerable distance, makes necessary the installation

of direction and distance sign posts. It is believed that such installation should be included in all contracts for new construction, and in maintenance contracts when not provided in the original contracts.

"All state roads should have well designed concrete or stone mile posts of uniform size and form. The inscription on the side of the stone toward the approaching traveler should state the name of and the distance to the terminal of the state road toward which the traveler is going. There should also be small concrete stones to mark each tenth of a mile for the use and convenience of engineer and inspector who may thus more readily locate and direct repairs.

"All state and county roads should have three classes of elevated signs: A. Distance and direction signs. b. Police and warning signs. c. Warning symbols.

"Each class of elevated signs should, as far as possible, be uniform in material, size, form, color, height, distance from edge of road, and location with respect to the indicated topographical features and should be indestructible as far as possible."

Among the recommendations of the board are the following:

Complete records of all employees be kept in order that the most efficient organization can be soonest perfected.

Dangerous curves on state and county highways be widened and suitably banked.

Old road surfaces be utilized for foundations, as far as practicable.

The engineering or construction department be made permanent and kept free from politics, and be required to pass upon technical matters only.

The commissioner prescribes regulations limiting the size, width and weight of vehicles, and governing the width and character of tires.

COST OF CONCRETE PAVEMENT.

The following table of cost of constructing a concrete pavement on a county road near Emery, Ia. (said to be the first highway improvement of the kind in the state) was compiled by County Engineer Ben P. Lampert. The items include practically all of Mr. Lampert's time, although part of it was employed on other work, one-fifth the cost of the plant used, and all other items. The average haul of material was two and one-half miles. The sand used was taken from the county farm and no charge made for it. Possibly two cents a square yard should be added for this. Teamsters helped load material. The sand was not screened and ran about ten to fifteen per cent one-quarter inch and up.

Cost of Constructing Concrete Road at Ft. Dodge, Iowa.

TOTAL AMOUNT LAID, 9,472 SQUARE YARDS. APPROXIMATELY 3,100 CUBIC YARDS OF GRADING (CUT AND FILL).

Labor on Concrete.

Based on average organization and average rate of 500 sq. yds. daily.

No. of men.	Job.	Cost per day.	Cost per sq. yd.
2	Finishing and removing forms..	\$8.00	\$0.0160
2	Striking off concrete	5.50	0.0110
1	Fireman on mixer	3.50	0.0070
1	Engineer on mixer	4.00	0.0080
2	Side forms and joints	6.00	0.0120
1	Cement	3.00	0.0060
2	Wheeling and shoveling sand....	5.50	0.0110
3	Wheeling stone	8.25	0.0165
6	Shoveling stone	16.50	0.0330
1	Extra, fixing subgrade	2.75	0.0055
1	Water boy	1.00	0.0020
1	Hose boy	1.00	0.0020
23		\$65.00	\$0.1300

Material and Handling Same.

Job.	Total cost	per cu. yd.	per sq. yd.
Grading: wheel scraper and wagon work	\$497.25		
Loading wagons	60.00		
	\$557.25	...	\$0.0588
Surfacing	307.50	...	0.0325
Baker joints and felt	536.40	...	0.0566
Sand, 874 cu. yds. taken from pit:			
Stripping pit	60.00*	...	...
Loading	129.50	...	...
Hauling	243.00	...	...
	372.50	\$0.426	.0393
Crushed stone, 560.74 cu. yds.	560.74	...	...
Freight	285.09	...	...
Loading	141.45	...	...
Hauling	341.00	...	...
	1,328.28	2.37	.1405
Gravel, 885 cu. yds.	595.04	...	...
Freight	403.02	...	...
Loading	123.50	...	...
Hauling	493.00	...	...
	1,614.56	1.89	.1705
Cement, 2,413 bbls. at \$1.56 on cars.....	3,764.28	...	...
Hauling	217.17	3,981.45	.4203
Total	\$8,697.94	...	\$0.9183

General Charges.

Freight on mixer, both ways.	184.94		
Engineer	49.70		
	234.64		.0247
Miscellaneous teaming	71.43		.0075
Oil, coal, gas, repairs.....	60.55		.0064
Misc. labor, unloading mixer, laying pipe, building culvert, lost time, etc.....	176.69		.0187
Engineering and foreman....	125.00		.0132
One-fifth of cost of plant....	105.00		.0111
	773.31		.0816
Totals, all expenses	10,750.72		1.13

*Not included in calculating cost.

TO IMPROVE FRENCH ROADS.

During the past summer there was published in certain American newspapers a statement purporting to have been made by M. Thierry, Minister of Public Works in France, to the effect that a large sum of money—variously stated at from \$10,000,000 to \$50,000,000—would be expended during the next ten or twelve years in putting a tar coating or surface upon 6,000 miles of French roads. This alleged announcement aroused such widespread interest in the United States that an investigation has been made by Consul General Frank H. Mason, who reports that M. Thierry did not state that the roads of France were to be improved or preserved by the use of tar or any other specified material. What he did say was that, if the necessary money could be provided, the government would adopt and carry out measures best calculated to improve the durability of macadamized roads and fortify them against the increasing strain and wear of motor-car traffic.

At present experiments are being conducted by the Direction of Roads, at the Ministry of Public Works, in the Departments of Seine-et-Oise, Seine-et-Marne, and will be shortly commenced in the Meurthe-et-Moselle, to test the respective merits of several substances and methods of application which are now employed in Great Britain for the repair and preservation of macadamized roads.

Most of these surfacing compositions, as, for example, "tarmac," contain coal tar, but the French Ministry of Public Works has no intention of adopting the system

of merely tarring the surface of the roads. This process has been thoroughly tested in France, and while it has served to allay dust and temporarily protect the surface of roadways from the infiltration of water and consequent rapid deterioration, the tar soon wears out and has to be renewed. This primitive process does not, therefore, fulfill the requirements of the Ministry as to permanence or in consolidating and strengthening the surface to meet the demands of modern traffic.

During the past five or six years experiments undertaken under the auspices of the Automobile Club of France have been conducted with great intelligence and persistence on the main road between Paris and Versailles, which is subject to a heavy and unceasing traffic. Tarring proved but a temporary relief, and the only successful results have been achieved by breaking up the worn surface of the road, filling the holes, rolling down the loosened materials, and then covering the roadway with a layer 2 inches or more in thickness of finely broken stone and sharp gravel mixed with a matrix of tar, asphalt, etc., which, on being rolled down, hardens into a firm, waterproof stratum strong and heavy enough to resist the wear and tear of motor vehicles and other traffic. Whether the result thus attained will satisfy the Ministry of Public Works and form the basis of a general system remains to be seen.

In any case it will be some time before the proposed legislation can be accomplished and the experiments with materials and methods completed. As at present proposed, the new law will provide for letting the work by contract to bidders, the Ministry of Public Works taking no part in the process, with the exception of surveys and inspections by its engineers and paying for the work as it is completed.

BITULITHIC IN TWO COUNTIES!

State Highways in Oneida and Herkimer Counties, New York—Extra Width and Quality Paid for by Municipalities.

Counties as unit fields for public improvements are a comparatively new phase in municipal development. The word "municipal" is used advisedly because in law a county is just as much a municipality as a city. It is a political subdivision of the state to which certain of the functions of government have been delegated for convenience of administration, and some corporate or business duties have been imposed in accordance with the growing tendency of the municipality to provide more and more of the utilities that are needed for the com-

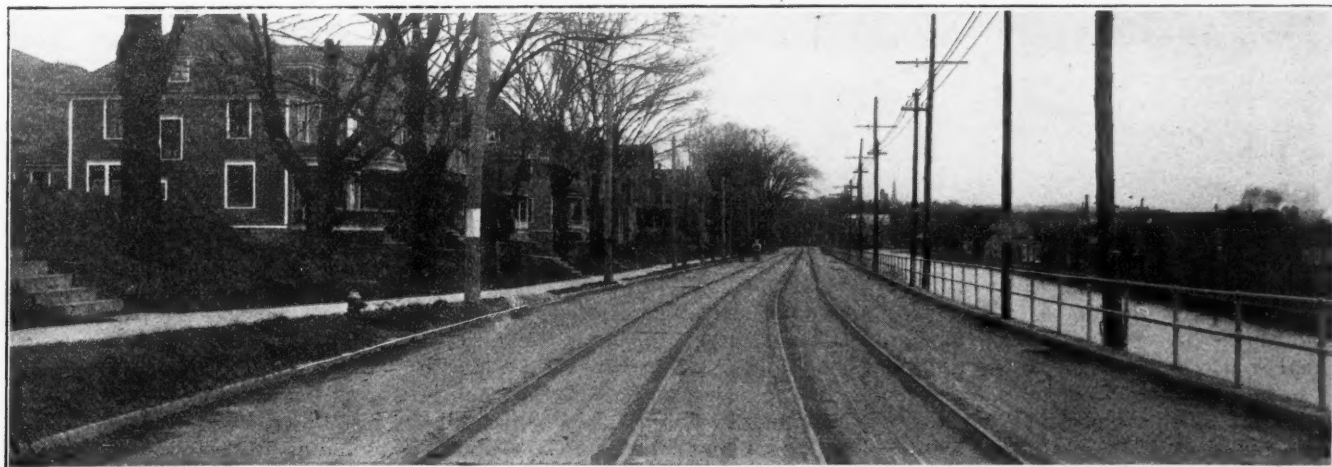
mon good. So far counties have performed few of the corporate functions of government beyond the care of streets. But there are signs that before many years matters of sewerage, water supply, lighting, fire protection and the provision of parks and public amusements may become notable county activities.

However, whatever the future may bring forth, the activity of counties in street improvements has been notable. While the names of cities and towns are widely known throughout the country, the name of counties have been almost unknown outside of their own state. Who, even among well-read citizens, can name the counties in which our ten largest cities are located? The names of a few counties, however, have become widely known in the last few years and entirely as a consequence of the extensive road improvements which they have undertaken. Cuyahoga county was well known for its brick pavements, even to people who did not know that Cleveland was its county seat. Wayne county is known from one end of the country to the other for its daring innovation in concrete road construction. Among other counties which are becoming widely known for their road improvements the following names are probably familiar to most people: Duval, Fulton, Allegheny, Tarrant.

Oneida and Herkimer counties, New York, bid fair to become as widely known for their bitulithic as are Cuyahoga and Wayne for their brick and concrete pavements. The keen interest shown by the people of Oneida and Herkimer counties in the improvement of highways is attested by the fact that 315,000 square yards of permanent pavement were constructed in three counties from September, 1912, to November, 1913, 85 per cent of which was bitulithic.

In the selection of the kind of pavement in these two counties the initiative has been taken in every instance by the property owner on the street to be paved. This does not mean, however, that the judgment of the governing bodies which have acted on the petitions has been superseded; they could have exercised their veto power if they had thought that the interests of the community required it.

The legal steps leading up to the paving of a street are generally complicated and somewhat inconsistent in some details. This in New York State is due to the adaptation of a general highway law to statutes already existing regarding cities, towns and villages. For instance, in a municipality of one class the work is paid for partly by assessment, in another the cost is a charge against the municipality at large. However, in no instance has this interfered with the free choice of a pave-



ALONG THE ERIE CANAL.

ment by the people most interested in the first instance, if approved by the authority which acts on it, either village, town, city, county or state.

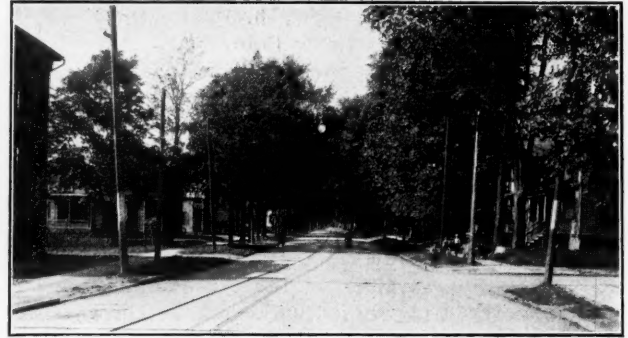
The most interesting work in these counties is perhaps the state highway work. Highway Route No. 6, the main road from Albany to Buffalo, crosses these counties. While actual figures of traffic census are not available, it is said by those who have had the best of opportunities for observation that Route No. 6 is the most heavily travelled highway in the world. Under the state law, the Highway Department pays out of its bond issue for a 16-foot roadway and various appurtenances. There is a provision in the law that where a highway passes through a municipality the governing body may decide to have the street paved for a greater width or in accordance with plans requiring a greater cost. In this case the procedure is for the governing body to petition for a modification of the plans, agreeing to pay for the increased width and modified construction, in accordance with laws governing new paving in their community. In the case under consideration the governing boards have acted only on petitions from the property owners.

The construction of a stretch of more than five miles on Route No. 6 is just being finished. This highway passes through the village of Frankfort, town of Frankfort, town of German Flats (first town in the state to pave a street under the highway act providing for modified plans and more expensive construction) village of Ilion and village of Mohawk. The roadway varies in width up to a maximum of 42 feet. The grade of the street is very moderate, with nothing that could be called a hill in its whole length. It carries two interurban car tracks and has concrete curbing on both sides. The concrete is 5 inches thick, made of local stone, sand and gravel. The bitulithic surface is 2 inches thick, the stone used being Hudson river trap rock brought in canal boats.



CONSTRUCTION WORK IN LITTLE FALLS.

An interesting feature of the work is a retaining wall 924 feet long and from 6 to 12 feet high on the north side of the street in the town of Ilion. The old Erie canal is nearly parallel with the wall, and at this point it is so close to the street that the widening of the street called for by the improved plans required filling toward the canal and a retaining wall was necessary to admit of this. The wall is 18 inches wide at the top, has a batter of 1 in 3 on the canal side and 1 in 4 on the street



STATE HIGHWAY IN ROME.

side. The bottom is widened out into toes 2 feet on each side and 2 feet thick. The filling of this street was done carefully, in 6-inch layers of dirt, each spread and thoroughly rolled before the next was placed. The fill stood over one month before the paving was laid and showed no signs of having settled.

On the retaining wall is a fence of 2-inch steel pipe. Oiled wooden plugs were set in the concrete to take the uprights. Tile was tried first, but too much trouble was experienced in taking them out. As a sort of extension to the retaining wall where the fill was less, 1,440 feet of extra heavy retaining curb $1\frac{1}{2}$ feet deep was constructed and the rail was set on this curbing. There are also 1,772 feet of wooden fencing along the canal side of the road. Both steel and wooden rails are painted with three coats of white lead.

In nearly all streets where there are car tracks delays to work are common. At times, however, work on this road proceeded rapidly, as many as 500 men and 70 teams being employed at one time. Four concrete mixers were used at one time, two of them Austin street pavers, mixing 500 cubic yards of concrete in a day.

The bitulithic mixing plant was of the semi-portable type. Two stone dryers, two tanks, screen, bin, weighing device, boiler, engine, etc., were all of the usual type used by the Warren Bros. Co. The largest day's work was 400 batches, but 300 batches of 1,240 pounds each was considered as a good average day's work.

Not all of the bitulithic pavement on Route No. 6 is in the continuous stretch above described. In Little Falls, about eight miles east, on the main street, is a section paved in 1909. Genesee street, Utica, which is in Route No. 6, was resurfaced with bitulithic this year. Besides Route 6 there are a number of connecting routes of the same construction in Rome, Whitesboro, Yorkville and Herkimer; and the same construction has been used for other than state highways in

Rome, Ilion and other places in the two counties under consideration—Oneida and Herkimer. The first pavement of this kind to be laid in these counties was constructed at Rome in 1902, and no more was laid anywhere in the counties for five years following, when the first had been well tested. Since 1907 it has been laid in increasing quantities. Among the smaller municipalities Ilion has been one of the most active in its paving operations.

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DECEMBER 4, 1913.

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Highway Department Organization.

New York State has recently adopted a plan for re-organizing its highway department. Pennsylvania's highway department has been operating under its present organization for a year and a half. Both systems were carefully planned, in the light of past experience throughout the country but in necessary conformity to state laws. But they differ from each other in their fundamental principles—more, probably, than in practical operation and in results obtained. Both are described in this issue.

In Pennsylvania the primary subdivision of authority and responsibility is on the basis of the nature of work to be done—new construction, maintenance, bridges, etc. In New York the primary subdivision is geographical—nine division engineers, each in charge of a division of the state, and about sixty sections, each in charge of an assistant engineer. In Pennsylvania each district has a corps under an engineer to supervise construction, another corps under another engineer to attend to maintenance, and a bridge engineer and an "experimental" engineer whose field is the entire state. In New York each division engineer has charge of all surveys, con-

struction, maintenance and other department work in his division.

If the New York scheme is adhered to and carried out (political conditions in the state make any prediction concerning the highway department very difficult) it will be interesting to compare the effectiveness of the two methods as developed by the operations of the next year or two.

Preparing for Next Year's Work.

This year's construction work is still under way on highways in most of the states, but nevertheless steps should be taken at once to prepare for next year's work. If possible contracts should be let before March for most of this, which will permit contractors to make ample preparation for beginning work as soon as the frost is out of the ground instead of losing one to three months of good weather in the Spring, as is so often the case. And there are incidental advantages which may mean reduced cost, if not better work. For instance, much of the quarrying, stone crushing and hauling may be done during the winter, when wages are lower; certain of the materials—tar, asphalt, etc., for example—may be obtained early and distributed along the work, whereas such materials may be difficult to obtain when the spring demand begins, meaning delay in the work; moreover the cost of both material and of hauling may be lower in the winter, the latter because team hire is lower and, in cases of roads which are in very bad condition in the spring, because the hauling is easier.

There is preparatory work for the engineers which it is especially desirable to do at once (if it has not already been done). Not only should the department have surveyed the roads to be improved, but it should have investigated the presence of ground water calling for drains, the location of quarries, sand banks, gravel beds, etc. Knowledge of these may prevent errors in deciding upon the character of improvement to be contracted for and especially the "extras" and supplemental agreements which too often increase the estimated cost in an embarrassing manner.

If the construction work is to be performed directly by the highway department's forces there is even more reason for thorough preliminary investigation. For it is necessary for the department to decide not only what is to be done, but the details of the manner of doing it. The location of quarries, how they are to be worked and with what appliances; how the material is to be transported to the work from quarry, railroad, far or near; where the labor is to be obtained and how housed, and an infinite number of details should all be decided before spring.

Taxpayers and even engineers are apt to criticize contractors because they so seldom finish their work at the time agreed upon. Is not some criticisms due to the engineers and other officials (especially, perhaps, to legislatures and councils) for delays in preliminary work which necessitate the rush at the finish?

Pavement Opening in Winter.

From December 1 to April 1 Muncie, Ind., according to a news note in last week's issue, will give no permits for opening any paved streets except in cases of absolute necessity. Probably many other cities adopt and some enforce the same rule. All should do so, for it is very difficult to do good work in repaving in freezing weather. Frozen lumps of earth and even pieces of ice are very apt to be thrown in with the back filling, and get into the concrete as coarse aggregate; ice and snow may be left on the concrete base, to thaw and let the surface material settle later on; paving stones, bricks

or blocks may be laid with ice adhering to them; and if they are chilled to much below freezing temperature while waiting for the grout to be poured, this will be frozen if cement or hardened if bituminous filler, no matter how much it may be heated, and can not be made to penetrate to the bottom of the joint. All this means that even with the best of inspection it is almost impossible to do good work; and in cold weather the inspector's temptation to desert the work for a shelter is greatest.

Altogether the chances of having a pavement properly relaid are so poor during freezing weather that a city is certainly justified in refusing to allow any excavation in the winter time unless to repair breaks or for other imperative reasons.

Indianapolis Municipal Asphalt Plant.

The municipal asphalt repair plant of Indianapolis, Ind., was installed in June, 1908, and was described in our issues of October 28, 1908, March 3, 1909, and February 9, 1910. The following information concerning its recent operation is obtained from the report for the year 1912 of Frank H. Hoss, the superintendent of the plant:

The department began laying asphalt surface for the year 1912 on January 2d, and during the remainder of the year up to December 31st turned out 23,535 boxes of asphalt surface mixture, 613 boxes of cushion and 126 boxes of binder, making a total of 24,274 boxes of mixture turned out during this period, or 4,888 more than had ever previously been turned out by the plant. The average capacity of a box was 5.3 square yards. During the year 1911 the plant turned out 19,386 boxes averaging 5.9 square yards, and during 1910 19,561 boxes were turned out averaging 5.4 square yards to the box.

The costs per square yard during the years 1910, 1911 and 1912 were 69.5 cents, 63.2 cents and 66.6 cents, respectively, these sums being obtained by dividing the total expense account by the total yardage laid. The cost to the city for repairs was less than this, if we obtain such cost by deducting from the total expense account the amounts received for private work done by the repair plant and divide this by the number of yards of public repairs. The costs so obtained during the three years in question were 53.3 cents, 54.7 cents and 53.1 cents, respectively.

During 1912 the department laid 106,070.15 square yards of asphalt surface for maintaining streets out of guarantee, and 22,103.53 square yards of surface were laid for public service corporations, contractors and plumbers, and for guarantee repairs made at the expense of the paving companies concerned. This makes a total of 128,173.68 square yards of repairs made during the year. The expenditures during the year were \$41,315.93 for actual salaries and wages, and \$41,993.59 for materials. Deducting from the value of materials, tools, etc., on hand January 1, 1912 (\$9,001.03), the value of those on hand January 1, 1913 (\$6,834.73), we have the sum of \$2,166.30 to be added to the expenditures to arrive at the actual cost of the work done during the year. The bills rendered for repairs made for private purposes amounted to \$20,542.83. Deducting this from the total cost of operating the plant as above and adding 10 per cent of the original cost of the plant (\$2,055.76) as depreciation, and 5 per cent of this cost as interest on the money invested, would give the cost to the city of the public work done \$68,016.63, or 53.1 cents per square yard.

The repairs were scattered over fifty-six different streets, some of them amounting practically to complete resurfacing. The equipment on hand January 1, 1913, included three 5-ton tandem steam rollers, two hand rollers, two mixing pans, one automobile R. H. C. roadster, sixteen wagons, two Iriquois surface heaters, one

16,000-gallon fuel oil tank, a 50-gallon portable kettle, three fire wagons, thirty-four asphalt cutters and a number of rakes, shovels, hoes, picks, etc.—totaling ninety-four; also lanterns, wagon covers, coal bags, etc.

The machinery has been thoroughly overhauled, and numerous repairs were made to the plant during the year.

Carrying a Street Across a Valley.

The site of the city of Newcastle, England, was originally crossed by several gullies traversing the centre of the town, most of which were filled up as the city grew. However, the eastern part of the city is still divided from the western by a deep, wide valley called the Ouseburn, which carries a stream of the same name. At the present time the only direct communication across this is by a brick viaduct, the roadway of which is 120 feet above the stream. This was built in 1877 by a private company, and purchased by the city in 1895 for \$600,000. With the growth of the city this viaduct has become altogether inadequate, even though it has been widened to accommodate street railways.

In 1900 the city council began investigating the problem, and in 1903 a committee reported in favor of filling up this valley, which they considered more economical than building viaducts. The cost of acquiring the land was estimated at about \$800,000, but it was estimated that there would be considerable revenue from fees charged for permission to dump materials into the valley and from the rental of the properties acquired, both before and after the filling. The total depth of filling would be about 100 feet, and the width of the valley at the top varies from 550 feet to 1,200 feet. It was decided in 1904 to carry three thoroughfares across the valley in fills 60 feet wide on top, and to construct at the bottom of the valley a storm sewer sufficiently large to carry the maximum floods of the stream. The estimated quantity of filling required was about 4,500,000 cubic yards; and it was calculated that to carry the runoff from the drainage area of 25 square miles would require a conduit with a cross section of 477 square feet on a grade of 1 in 141, giving a discharging capacity of about 964,000 cubic feet per minute. This conduit would need to be about 2,060 feet long if built through the entire length of the gully from the upper end of the fill.

As progress was made in carrying out the scheme, it was found that the purchase of the property required larger appropriations than had been estimated, and that the quantity of filling material available was not nearly as great as had been anticipated, partly owing to a considerable falling off in building and other construction work in the city. Consequently, in 1909 council decided to concentrate the fill at one part of the valley and gradually fill up in a northerly direction so as to form two main highways; also to limit the construction of the conduit to only a sufficient distance to extend through the filling, something over 1,000 feet. By thus limiting the work it is hoped to be able to make an embankment giving a road 250 feet wide in about five years, and to complete the fill to 60 feet of width in about eleven years. Another fifteen years would then, it is estimated, be required to continue the embankment far enough north to accommodate a second highway. Improvement in the building trades, if it should come, would shorten these periods. The estimate of the cost of this work, given in the spring of 1913, was about \$1,125,000. The amount of filling required for this modified scheme would be about 1,750,000 cubic yards. The above information is obtained from a paper read before the Institution of Municipal and County Engineers by F. I. Morgan, assistant to the city engineer of Newcastle.

The WEEK'S NEWS

Road Prospects—"Good Roads' Days" Continue—Increased Salinity of Hudson River—Damaging Sewer Explosion in Pittsburgh—White Ways Becoming Popular—Installing Fire and Police Alarm Systems—The Proposed Chicago Subways—Growth of Municipal Ventures.

ROADS AND PAVEMENTS

Good Roads in Ohio Assured.

Columbus, O.—Millions of dollars for highway improvement in Ohio each year are assured by the decision of the Supreme Court holding valid the Hite road tax law. The last barrier to better roads in Ohio has been removed, and the state is ready to engage in a comprehensive campaign of road building. A system of inter-county and main market roads has been completed by the State Highway Department that includes 9,200 miles, touching every county in the state. Great arteries of travel connecting the more important centers, will run across the state, while from these will radiate laterals that will touch every township. The Hite road law levies a tax of one-half mill on all property in the state. This will raise this year about \$3,500,000. The law provides that three-fourths of the gross sum shall be turned back to the credit of the counties, making about \$30,000 for each county. This sum is available for road improvement in the county when the county raises an equal sum. If all counties in the state take advantage of that provision, as nearly all have signified their intention of doing, there will be about \$5,000,000 available for road improvement annually.

Parade Over New State Highway.

Hatboro, Pa.—Following the completion of a section of the Old York Road on Saturday, November 29th, the residents of the townships through which the road passes held a celebration, consisting of an automobile parade from Hatboro to New Hope and return, passing over the stretch of 8½ miles of reconstructed highway. At a meeting following the banquet held in Hatboro, after the parade, a unanimous vote of thanks was extended to the State Highway Department for having rebuilt this particular section of Old York Road.

Stratford Gets New Roads.

Stratford, Conn.—Stratford is getting her share at present of new roads. The beautiful new road on Stratford avenue is very near completion and the work on North Main street is well under way. It was announced that the state will build a new road from Paradise Green to Pine Rock Park. This road will be built at the expense of the state. The contracts for the job have already been let by the state commissioner and work will be started in the near future. The road will probably be a gravel one. It will be oiled. One of the state engineers in speaking of the road stated that the layout would be completed in a few days and that the workmen would be on the job shortly.

"Good Roads' Days" Continue.

Montbrook, Fla.—The eastern side of Levy county has observed road working day, and put in the 15-mile link connecting Alachua county road at Erie, near Archer, with Marion county-Blitchton road, near Morriston. Circulars announcing the program were issued and posted in all the towns and along the line of road. There were 2,000 persons and 500 teams at work on this link. It was reported that other sections of this county had turned out in full force. In Arlington several miles of the Chaseville road are in very much better condition than they were as the result of citizens observing the work-the-road proclamation of Gov. Trammell. A large number of Arlington citizens got enthusiastically into the game of working the road with their own hands and a surprising amount of road building was soon accomplished. One of the leaders of the

movement was A. C. Macy, of the Alderman Realty Company. The company started off the era of good roads in the Arlington section some months ago by the construction of several miles of good highway. The people of Mossy Head met and worked all leading roads from Mossy Head on "Good Roads Day" and several miles of road were repaired. The road leading north was straightened and a highway 25 feet wide was grubbed for several hundred feet. A donation of about \$50 was given by the citizens of this place for the purpose of putting this road in better shape. C. D. Meigs, county commissioner; Dr. S. E. Stephens and Geo. W. Keen, Jr., each gave ten dollars, and Griffin Pippin, A. L. Smith, C. M. Williams and several others gave liberally to the cause. Mr. C. Y. Barnes, the man who is helping to build the national highway through Walton county, furnished seven teams and drivers to haul clay for the citizens.

Stigler, Okla.—So successful was the first good roads working day in Haskell county that the county commissioners have decided to prosecute the work with renewed vigor. The rebuilding of a connecting road between Stigler and Keota was completed by 500 residents of these cities last week. December 2, residents of Stigler, Whitefield, Hoyt, Brooken and Enterprise worked one of the roads that connect these cities.

"Good Roads' Day" Each Month.

Rockport, Tex.—Rockport citizens again observed "Good Roads' Day," begun here on Nov. 5. At a meeting of the Young Men's Business League it was decided that a good roads' day each month would be instituted and continued until every road in the county was made a good road. Recently automobiles conveyed the men to the point to be worked and a force of men with teams, double that of Nov. 5, put in a full day's work on the Rockport-Aransas Pass road. The roads are being surfaced with shell, making them as near ideal as can be done without using asphalt.

An Interesting Highway Report.

Dunkirk, N. Y.—An interesting highway report was presented to the Board of Supervisors recently by Willis D. Leet, county superintendent of highways, showing the expenditures upon the roads of Chautauqua county and the permanent work done in many towns. The following is the report of Mr. Leet for the fiscal year ending Oct. 31, 1913. The money available for highway work was \$107,657.71:

Balances November 1st, 1912.....	\$7,233.50
Received from Taxes.....	54,400.00
Received from State Aid.....	37,794.50
Received from other sources.....	8,229.71
Total	\$107,657.71
The expenditures were as follows:	
For Labor and Team Work.....	\$78,676.99
For Rental of Machinery.....	7,822.36
For Materials	16,042.38
Total Expenditures	\$102,541.73
The total amount available for Bridge Work was.....	\$65,766.14
The total expenditures from Bridge Fund were.....	60,668.76
The total amount of Machinery Fund.....	\$9,054.48
The Expenditures from Machinery Fund were.....	7,672.14
The total amount of Miscellaneous Fund was.....	\$10,627.50
The expenditures from Miscellaneous Fund were.....	\$8,756.09
There have been built in the several towns during the year,	
108 Concrete Culverts, costing.....	\$7,792.79
There have also been placed 259 Pipe Culverts, costing.....	\$6,951.52
The new bridge work consists of 45 Bridges, costing total of	
	\$34,422.91

Nearly every town in the county has built some concrete bridges during the year, and the towns of Chautauqua, Ellery, French Creek, Hanover and Clymer have put in the largest of the concrete structures.

Favors Convict Labor for Roads.

Albany, N. Y.—Commissioner of Highways Carlisle is at present interested in the construction of the Storm King section of Route 3 of the New York State highways, and purposes to reduce the cost of constructing the road by utilizing prison labor. The commissioner intends to have introduced in the coming session of the legislature a bill to permit the use of convict labor on highway construction. Commissioner Carlisle estimates that by using convicts from Sing Sing on the work the cost of constructing the section of highway between Cornwall and West Point will not exceed \$100,000. This will entirely disarm any opposition which may be made on the ground of the excessive cost.

Ask Deposit for Opening Pavements.

Manasquan, N. J.—Hereafter contractors making taps on the borough water, gas and sewer mains will be called upon to make a deposit of \$10 with the borough clerk as a guarantee that the roadway will be replaced in good condition. Council directed Solicitor Frank Durand to prepare an ordinance to that effect. Councilman Herbert, chairman of the street committee, broached the matter, stating that in many places about the borough breaks had been made in the road and had not been refilled in the proper manner. The deposits will probably be held for thirty days to guarantee the permanency of the fill.

Road Progress in Kentucky.

Frankfort, Ky.—The first report of the Department of Roads, prepared by Commissioner of Roads R. C. Terrell, gives the number of miles of road in Kentucky at 58,000, of which only 10,636.5 miles are improved, besides which there are 300 miles of toll roads remaining. The number of acres included in the highways is 220,000, valued at \$50,000,000, based on the estimated cost of reproduction. The counties raised by local taxation \$1,933,000 for road work in 1912, most of which was used in repair and maintenance of roads and bridges, only about 20 per cent. of the fund being spent on new roads. New roads and bridges in 1912 cost \$200,000 and \$220,000 respectively. The counties had employed on the roads during that period 185,000 free laborers.

Street Improvement Limited by Bill.

Portland, Ore.—A resolution providing that no improvement of any street shall be made where the assessments are in excess of the assessed valuation of property has been passed by the council. Commissioner Bigelow, the author of the resolution, said that it has been designed to prevent the construction of pavements in residence districts where property values are so low that the property cannot be bonded for the improvements. Commissioner Dieck inserted an amendment in the resolution to the effect that where the property owners are unanimous the assessments may be in excess of the assessed valuation, and also in cases where the city deems that an emergency exists, the improvement shall be made.

Decide on Comprehensive Road Plan.

Springfield, Ia.—The principal roads of Sangamon County which are to be paved first under the Tice Good Roads Act have been decided upon by the Highway Committee of the Board of Supervisors, in connection with the highway committees of boards in adjoining counties, and the State Commission. The routes to be paved have been arranged so that every town of importance in the county is on one of the roads, and the roads will join paved roads in other counties, forming direct routes of many miles in length. The projected routes comprise 280 miles of the 1,400 miles of road in the county. About \$40,000 will be spent on paving of roads next year, and each year hereafter as much or more will be used until the entire projected series of pavements is complete.

Macadamizing Roads.

Greeneville, Tenn.—Greene county has more than two hundred miles of graded public roads, and the county having authorized the issuing of bonds for the purpose of mac-

adamizing the roads, this work has been commenced in earnest. Forces are now engaged in macadamizing two of the leading roads entering into Greeneville. It is expected that a considerable amount of this work will be done before cold weather sets in. Greene county will soon take the lead of all the counties in upper East Tennessee in road improvement work.

Creosoted Wood Block Paving for Charlestown, S. C.

Charlestown, S. C.—The paving of Meeting street, between Society and Market streets, and of Hasell street, between King and Meeting streets, has been completed, and the improvement of that section is most marked. From Society to Market street the rough granite block pavement has been replaced with creosoted wood block paving, making the thoroughfare one of the smoothest and prettiest in the city. Not only does the change improve the appearance of the roadway itself, but changes the appearance of abutting property to no little extent. Meeting street along that section is given the appearance of being wider. Hasell street, between King and Meeting streets, has also been paved with the creosoted wood blocks, and the improvement is equally as marked.

SEWERAGE AND SANITATION

Terrific Sewer Explosion in Pittsburgh.

Pittsburgh, Pa.—Almost a mile of a nine-foot sewer in the Lawrenceville and Bloomfield districts was rent with a terrific explosion last week that tore up streets and alleys, demolished houses and solid brick buildings and broke gas mains. Estimates place the more seriously injured at 17, but scores were slightly hurt. Sewer gas is generally accepted as the cause of the explosion. An emergency appropriation of \$50,000 to take care of the urgent part of the repairs has been approved by the Finance Committee of Council. The repair of the entire damage to the sewerage system may require \$1,000,000 and may necessitate a special bond issue. Millions of gallons of sewerage which are carried off in this great sewer flowed over the Baltimore & Ohio tracks. Nearly 200 of the railroad laborers were put to work cutting a trench to divert the flow of sewage. The John F. Casey Contracting Company has placed two gangs, one at either end, to dig up the line of the sewer.

Newark's Sewer Disposal Plant Finished.

Newark, N. J.—Newark's new disposal plant is now finished. The pipe line, however, will not all be in before some time the first of the year, so the modern disposal plant that has been constructed by Contractor L. B. Jacobs, can not be put in operation for several months. The disposal plant was designed by T. Chalkley Hatton, of Wilmington, Consulting Engineer to the Sewer Commission. Edwin G. Kastenhuber, Jr., of Easton, Md., as resident engineer representing Mr. Hatton, has supervised the work. While a little more than 75 per cent. of the pipe line has been laid, some of the hardest work is still left. This is especially true of that section of East Main street, where it will be necessary to go down 22 feet in laying the pipe to carry out the gravity plan of the sewer. The site of the disposal plant is considered ideal for the purpose. It is located several hundred yards from the town limits. The main pipe line goes out the East Main street to the point where McKee's Lane strikes the public road leading to Wilmington on a short distance from the town limits. A line of 12-inch terra cotta pipe will carry the sewer down McKee's Lane to the site of the plant about 1,000 feet from the road. The plot of ground purchased by the commission for the plant is 200x570 feet. While the present plant is sufficiently large to handle the sewage from a town three times the size of Newark, there is space left for additional filters should they ever be required.

Typhoid.

Chicago, Ill.—Typhoid fever has invaded Chicago with a force not felt for several years, according to the bulletin of the Health Department just issued. More cases have

been reported each week during the last month than for any similar period for several years. Figures of the Health Department show that 68 cases of typhoid fever were reported two weeks ago, compared with 58 the preceding week and but 16 for the corresponding week of 1912.

New Sewerage System at Valley Junction.

Valley Junction City, Ia.—The Valley Junction City Council has voted to accept the new sewage system which has recently been completed by the contractors. M. M. Norris, of the Iowa Engineering Co., who has acted as consulting engineer for the city, reported that the work was satisfactory and recommended that it be taken over by the city. A called meeting of the council was held to pass ordinances regulating the manner of making connections to sewers. A sewer inspector will be appointed.

WATER SUPPLY

Ashokan Reservoir Increases Salinity of Hudson.

Poughkeepsie, N. Y.—The relation of the filling of the Ashokan reservoir to the increasing salinity of the Hudson river in the neighborhood of Poughkeepsie formed one of the main topics of discussion at the meeting of the Poughkeepsie Board of Health. Mayor Frank, president of the board, said that the river water is getting constantly more salty, and that the natural supposition would be that the fresh water being taken by the Ashokan reservoir for New York City was being drained from the twelve-mile watershed in the neighborhood of Esopus Creek and its tributaries, which formerly emptied into the Hudson and were the main sources of the city's water supply. The boilers of the town's engine rooms are being rendered useless by the fact that the water's weight of salt encrusts itself upon their inner surfaces and is almost impossible to remove. The drinking water is growing noticeably cloudier, and complaints are coming in every day from the citizens as to what is going to be done about improving the water supply. "If," Mayor Frank said, "as is supposed by many of the people, the trouble is being caused by the new Catskill reservoir, our fresh water is being taken from us to satisfy the demands of the metropolis. If the salinity is being caused by the fact that the ocean is slowly reaching up the river and making the water saltier, there is no alternative but an entirely new system of supply, which would cost, in construction, many millions of dollars. There is very little doubt also that the streams and lakes in the vicinity would be utterly inadequate to satisfy the city's demands."

Filter Plant Overtaxed, Water Polluted.

Binghamton, N. Y.—A note of warning was sounded by Health Officer D. S. Burr to all water users, directing that until the new filter plant is completed all water used for domestic purposes be boiled. This is made necessary by the discovery of sewage bacteria in the filtered supply and the realization that the present filter plant is entirely inadequate to answer continually increasing demands. This is due, not to any special fault in the filter plant, but because the increase in population this year has so enlarged the demand on the pumping station that the present filter plant is too small to properly filter all the water required. The consequence is that river water loaded with sewage bacteria after a rain finds its way through the filter into the water mains, thus contaminating all the filtered water and the storage supply in the reservoir.

Success of Municipal Works at Lincoln, Neb.

Lincoln, Neb.—The water department of Lincoln has just issued an annual report concerning its municipal waterworks. The municipally owned plant in Lincoln is not only self-sustaining, paying all of its expenses, including maintenance, interest on bonds, and setting aside an amount to retire the bonds with, but it furnishes water to the other departments of the city aggregating 45 per cent of the total pumpage, which if paid for would increase the net profits of the waterworks very materially. Not only is Lincoln furnishing this water at a very reasonable rate, but pressure for both domestic and fire purposes is very much higher than the average in the United States. For instance, Lincoln offers for domestic purposes an average pressure of

fifty pounds and for fire purposes one hundred pounds. Saginaw, Mich., Terre Haute, Ind., and a small town in Massachusetts offer fifty-five pounds domestic pressure, but for fire purposes the pressure is not greater than in Lincoln. This city has a population of approximately 45,000 and consumes daily 3,200,000 gallons of water. The capacity of the present reservoirs is 3,800,000 gallons. The 1908 assessed valuation of the city was \$8,350,000, which produced a tax of \$292,250, the levy for that year being 35 mills. Had the city been compelled to pay \$100,000 for water, there would have to have been raised that year \$392,250, which would have increased the levy to 47 mills, or about 34½ per cent. As an illustration of what this means to the average taxpayer, the city tax on property worth \$2,000 would be \$14, but if the city had been compelled to pay \$100,000 for water, this tax would have been increased to \$18.80. During the first year the net profit exceeded \$15,000; during the second year \$10,000, and the third year \$13,000. There was a loss in 1901 of \$4,500, owing to improvements and additions made to the plant. The next three years showed a profit, but again in 1905 improvements and additions were made which resulted in the water-works showing a loss for the year of \$37,000. Since then the record has been a long string of balances on the right side of the ledger, the yearly record being as follows: 1906, \$9,600; 1907, \$23,500; 1908, \$19,000; 1909, \$24,500; 1910, \$14,700; 1911, \$16,000. During the year ending August 31, 1913, there was a net loss of \$541.98, the reason for this being the many new improvements some of which are listed as follows:

Laid during the year, 22,260 feet of cast-iron water mains.
One 500-H. P. Murray boiler and stokers for same.
One 1,500,000-gallon concrete reservoir.
One 6,000,000-gallon Snow steam pump.

A new addition to the southeast corner of engine room, and also an enlargement of the present boiler room.
One car unloader and hoist to elevate coal into the overhead bunkers.
One eight-foot concrete stack, 175 feet high.
Five two-inch test wells from 190 to 200 feet deep.
Two twelve-inch deep wells from 100 to 200 feet deep and several other minor improvements which have brought the total cost of construction to \$82,363.74, this being the largest amount ever spent for the station, equipments, and general construction in one year.

Altoona Has Solved Its Water Problem.

Altoona, Pa.—All the city's storage and service reservoirs are now filled with water, including Lake Altoona, in which there are 601,000,000 gallons, the big basin being filled to its capacity and running over. After the impounding dam became filled following the heavy rains of several weeks ago, Lake Altoona filled up very rapidly and several days ago it was filled and is now running over. The impounding dam holds 365,000,000 gallons; the Kittanning Point reservoir, 65,000,000 gallons; the settling basin adjoining Lake Altoona, 12,000,000 and the service reservoirs in the city about 10,000,000 gallons, so that the city now has available one billion and thirty-one million gallons. This quantity means an available amount in storage sufficient to last for 206 days, or over six months. The streams, however, pour a certain amount into the reservoirs even in times of drought, so that the water problem is evidently solved in Altoona.

Cannot Find Waterworks Leak.

Dayton, O.—Consternation is beginning to develop in the water department because of its utter inability to locate a bad leak or a series of leaks that developed and which now threatens to cause a serious water famine all over the city. There is scarcely any part of the city that is not now affected and there is no means of determining when the difficulty will be adjusted. Ordinarily there are not more than ten million gallons consumed each day, but last week it was found necessary to pump twice that much water daily to give the requisite service. The situation is particularly alarming because of the dangers that would arise in case a bad fire should occur. The theory is advanced that the leak may have occurred in the pipes under the river or canal. In this case it would be a difficult matter to discover it. The only means there exists of locating a leak in this case would be to stop up the mains on both sides of the streams and ascertain then whether this would have any effect upon the other mains. Another theory has it that the leak may have occurred in some section where there is a deep bed of gravel and that the surplus is being absorbed.

Statesville Buys Water Pump.

Statesville, N. C.—The city of Statesville has contracted for a modern water pump with a daily capacity of 1,000,000 gallons. The Board of Aldermen held a special meeting to consider improvements at the water station and hear representatives of pump companies who desired the contract for the new pump. The matter has been referred by the board to a committee composed of Mayor Caldwell and Aldermen Shelton and Cooper, who decided on a pump, and the contract was closed and signed. The first cost of the pump is \$4,100, and there will of necessity be considerable cost in its installation. The new pumping engine is of the Corliss type and weighs 21 tons. It has a daily capacity of 1,000,000 gallons and is guaranteed to furnish 200 pounds of fire pressure.

STREET LIGHTING AND POWER

Cut in Lighting Rates.

Virginia, Minn.—A reduction of almost one-half has been made in lighting rates by the water and light commission, and the action has been confirmed by the council at its meeting. Users of electric light will hereafter pay a straight rate of 7 cents per kilowatt-hour, with an additional discount of 10 per cent if paid within ten days after the bill becomes due. The rate heretofore was 12 cents per kilowatt-hour. No change was made in the minimum charge of \$1 a month for the reason that very few consumers use less than that amount. The power rate was fixed at 5 cents per kilowatt-hour, with a minimum of \$2 per month. A discount of 10 per cent will also be allowed on bills for power if paid within ten days.

Heating Companies Fail to Pay Tax.

Tacoma, Wash.—Many thousands of dollars have been lost to the city through someone's negligence, according to a report prepared by Deputy Controller J. H. Gonyea, and submitted to his chief, John F. Meads. The statement says that not one cent ever has been paid into the city treasury by any of the corporations that have been awarded steam and hot water heating franchises, although the franchise specifies that from 1 to 2 per cent of the gross earnings shall be paid in on or before Jan. 31 each year. There are nine heating franchises outstanding. Each runs for twenty-five years and all have practically the same wording regarding the annual statements and payments to the city. Controller Meads said that he did not know why the percentage of earnings of the steam heating companies have not been paid. Many of the large office buildings are heated by one or another of the nine companies. Assistant City Attorney Carnahan ruled that the city could still collect the money due.

City Rents Poles from Power Company.

Richmond, Va.—Arbitration proceedings to determine the terms and conditions upon which the city and the Virginia Railway & Power Company are to make joint use of poles, in progress for more than two years, came to an end with a decision handed down by Judge Beverly T. Crump, who, as sole arbitrator, fixes the rental at \$1 a year for each pole used. The question arose with the building of the city electric plant, when the city, in order to avoid the duplication of poles in the city streets, made use of the poles of the Virginia Railway & Power Company in stringing its transmission lines. The power company did not contest the city's right to the use of the poles, and it was agreed by both parties to submit the terms for the joint use of each other's poles to arbitration. Judge Crump finds that the city used 1,201 of the power company's poles in the year 1911. In 1912 the city used 1,886 poles. Under the \$1 a year rental determined upon in the award, the city owes the Virginia Railway & Power Company \$3,087 in pole rentals to Jan. 1, 1913. The award provides that the joint use shall be understood to mean the placing and maintenance of cross arms, trolley or lamp brackets, wires, cables, transformers, lamps, or other devices by either party in the conduct of its business, on the poles of the other party. The annual rental of \$1 entitles the licensee to the use of one pole for the space of one standard eight-pin cross arm, not to exceed ten feet in length, the cross arm and attachments not to occupy more than 26 inches

of the pole. Additional space on the pole, it is provided, shall be charged for at the rate of 40 cents for each thirteen inches. Additional cross arms are to be spaced at 26 inches, and are to cost the licensee 80 cents each a year. The award provides in detail for the various contingencies that may arise in the joint use of poles. Liability for accidents asserted by the claimant to have been caused by the owner and licensee jointly shall, it is provided, be assumed and defended jointly. If such a claim can be compromised by settlement before or after suit is brought, and one of the parties desires to make such settlement and the other party is unwilling to do so, the party desiring to make such settlement, the award provides, upon payment to the other party of one-half of the sum for which the claim can be settled, shall be relieved of all liability for such claim, and the party to whom payment is made shall assume the entire liability.

White Ways Increasing.

Cleveland, Tenn.—Cleveland's White Way continues to grow. There are now 21 3-light posts in operation around the public square and another shipment of posts has just arrived, which will be installed at the earliest possible date. The promoters hope to have the White Way completed by the first of the year.

Munfordville, Ky.—The citizens of Munfordville are rejoicing over the installation of electric lights, which have just been turned on. The progressive town council contracted with the lighting company for street lights, and now every street is brilliantly lighted.

Municipal Electric Plant Has Only Three Customers.

Wymore, Neb.—Success or failure of Wymore's municipal electric plant depends upon the loyalty of the people of the city. The municipal plant now has only three customers, and unless 75 or 80 per cent of the entire business to be had in the city is secured it will be a financial failure to operate the city's plant, according to Mayor J. A. Ruefing. A number of citizens favored the operation of the city's plant on a 24-hour basis instead of twelve. They stated they would patronize the city's plant if continuous service is given.

Cannot Shut Off Gas Supply.

Buffalo, N. Y.—The appellate division at Rochester has granted an order on the application of Corporation Counsel Hammond staying the effectiveness of the decision by Judge Woodward. This decision vacated the injunction obtained by the city restraining the Buffalo Gas Company from shutting off the supply of gas to streets and public buildings. The motion was opposed by L. Babcock, attorney for the company. The order was granted with the understanding that the appeal from the decision of Judge Woodward will be argued this month. It is claimed by the attorneys for the gas company that the city owes nearly \$300,000 for service rendered up to October 1. Attorney Babcock told the court that the public-service commission having decided that the rate for 1,000 cu. ft. of gas furnished by the Buffalo Gas Company shall be 90 cents, there is no reason why the city should not pay the bill. The stay granted by the appellate division prevents the Buffalo Gas Company from shutting off the supply of gas.

FIRE AND POLICE

Install Fire and Police Alarm System.

Alton, Ill.—A gang of men have begun to install twenty-five signal boxes for the police and fire call system contracted for by the city with the Kinloch Telephone Co. The system will center at police headquarters and will include telephone boxes in various parts of the city which the public may have access to and may use to send in signals to the police headquarters, when they need help. With the system are twenty-five signal lamps which will be illuminated whenever an officer's aid is needed and he is wanted to receive instructions from headquarters. The central desk in headquarters will receive a call and indicate the location of the box from which a call comes in. The boxes which will be set out in twenty-five different points of the city, can be opened for use in sending in a fire or

police call only by breaking a small piece of glass, which may be smashed with a stone or any other hard object. Behind the glass is a key which may be fitted in the lock of the box and the door may be opened. When the door is opened, the person desiring to use it will find a little knob which he must turn forward, then release again. Then he may take up the telephone receiver and await a reply from police headquarters.

Ship Engines to Fires in Other Towns.

Gadsden, Ala.—Fire Chief Stallings said that he is having a device made whereby the fire engine and automobile fire truck can be loaded on freight cars without any unnecessary delay. Stagings will be built to permit the equipment being raised into the cars, and if Gadsden receives a call from any of the nearby towns for aid when fires are raging, the equipment can be loaded in a very short space of time.

To Carry Owners to Fires.

Portland, Ore.—The Commercial Fire Dispatch Company has been granted a revocable permit by the Council to install connections with the city fire alarm system and operate automobiles for the purpose of carrying owners of buildings and stores to fires. The activities of the company will be confined to holidays, Sundays and at night from 5 p. m. to 8 a. m., when the mercantile houses are supposed to be closed. The ordinance has been recommended by the fire chiefs, who said that the activities of the new company would assist them in their work.

Install Police Alarm System.

Portsmouth, Va.—Work has started on the police telephone and telegraph system, acquired several months ago by councilmanic appropriation as an adjunct to the police department. Superintendent W. M. Smith, of the fire alarm telegraph system, communicated with the Gamewell Company, builders of the police telegraph equipment, with the result that a representative of the company has arrived and commenced the work of wiring.

MOTOR VEHICLES

Mayor Proposes Complete Motorizing.

Scranton, Pa.—Much interest centered in the proposal of Mayor-elect E. B. Jermyn that horses be abolished from the fire department and that motor power for all fire apparatus be substituted. The mayor-elect believes that the present fire engines could be transformed into motor-driven apparatus for about \$3,000 each, and that the saving to the city in the long run would warrant the expenditure. The fire department now has fifty-two horses, which cost the city about \$8,000 annually for their feed and care. The city has seven fire engines, eighteen hose wagons and one hook and ladder truck. Three of the hose wagons are motor-driven and there is one auto hook and ladder truck.

Pumping Auto Engine Stands Test Well.

Martins Ferry, W. Va.—The new auto fire truck made by the Ahrens-Fox Company of Cincinnati, and purchased by the city of Martins Ferry, has been tried and proved that it could do all the work which it is claimed it will do. In the first test the pump was attached to a plug at a street corner and water was thrown to a height of about 130 feet. The machine was then attached to another plug and through a 1¾-inch nozzle the engine pumped 920 gallons a minute and through a 2-inch nozzle the engine threw 1,000 gallons per minute to a height of 150 feet.

Auto Patrol for Virginia, Minn.

Virginia, Minn.—The emergency police patrol recently purchased by the police and fire commission has arrived in the city, being driven up from Duluth by J. T. Peachey, agent for the Velie Auto Company. It is a six-cylinder, 60-horsepower car, fully equipped and cost \$3,800. It is equipped with cots, stretchers and all the conveniences necessary to a first-class ambulance and is an exact counterpart of the new patrol wagon recently put in service by the police department at Duluth. The patrol wagon service adds two new men to the police force.

GOVERNMENT AND FINANCE

Compromises Federal and City Manager Plans.

Columbus, O.—Following the adoption by the charter commission of the resolution offered by Commissioner Theodore Leonard, which provides for a commission manager plan for Columbus, a sub-committee of the charter commission, headed by Commissioner Edgar L. Weinland, was set at work to draft a charter to be submitted to the commission. On this committee with Mr. Weinland are Commissioners Leonard, Kornfeld, Gemuender and McCleary. The charter to be drafted for Columbus, according to the Leonard resolution, will differ from the commission manager plan in other cities in that it provides for the election of a mayor to have charge of the police and fire departments and the election of a council of four men from districts. This council, acting with the mayor, will take the place of the present council of nineteen members and will appoint a city manager. The resolution as adopted provides for a mayor, auditor and city attorney, to be elected by the people. Four councilmen are to be elected, one from each of four districts. The mayor is to be the chief conservator of the peace and to have direct supervision of the police and fire departments, under proper civil service regulations, and to represent the city in all of its relations with other municipalities and with the state. The mayor and four district councilmen are to constitute a City Council with general legislative power, the mayor being presiding officer thereof and having co-ordinate powers therein with the councilmen. The City Council is to appoint a treasurer; also a general manager, who shall supervise all departments of municipal government excepting those committed to the mayor, the auditor and the attorney; the manager to be subject to removal by council. The term of councilmen and elected officers is to be four years, subject to recall, half to be elected every two years. All elections are to be by non-partisan ballot.

Provide for City Purchasing Agent.

Atlanta, Ga.—Council has passed an ordinance creating the position of city purchasing agent at a salary of \$1,800 per year, the position to be filled by the mayor, the comptroller and the finance committee chairman acting jointly. That the city needs a purchasing agent has been generally recognized by council members for years, and several efforts have been made to create such a position. More than \$1,000,000 annually will be spent by the purchasing agent, and it is believed a competent man can save the city \$10,000 per year at the most conservative figure.

City Exceeding Bonding Power.

Pittsburgh, Pa.—An obstacle has been thrown in the way of the realization of the new City Hall and Court House Annex, and the improvements depend on the outcome of an injunction suit filed against the county commissioners and the city officials. Among the objections brought out at the preliminary hearing in the injunction case is that the city's share of the cost of the new building would exceed the bonding power of the city; that the act of the legislature allowing the city and county to enter into the joint contract is unconstitutional; and that the bond issue of \$1,500,000 voted by the people was for the erection of a city hall upon property then owned by the city.

Commission Form of Government Widely Adopted.

Pittsburgh, Pa.—Twenty of the third-class cities of Pennsylvania were represented by mayors, city solicitors and councilmen-elect at a conference held in Harrisburg to frame a general scheme of government which will become effective soon under the provisions of the Clark commission form act. Local conditions will require rearrangement of the work of the five councilmen or the departmental heads in the division of the municipal duties, but the general plan decided upon apportions the city machinery among the mayor and the four councilmen as follows: Public affairs, accounts and finances, public safety, streets and public improvements, and parks and public property. The committee framing this plan consisted of City Solicitor F. P. Schoonmaker, Bradford; F. P. Cummings, Williams-

port; A. A. Cochran, Chester, and Thomas J. Hare, Altoona, and Mayors Ira W. Stratton, Reading, and John K. Royal, Harrisburg.

\$3,000,000 City Bonds Sold in Three Months.

San Francisco, Cal.—All of the bonds offered for sale at the city treasurer's office have been disposed of, sales amounting to \$428,000 having been made on the last day. One buyer took a block of \$286,000 and the remainder went in comparatively small parcels. These 5 per cent bonds were sold at par. Since Aug. 19, when the first offering in recent months was made, the sales of these city bonds have amounted to \$3,045,000, all with the exception of \$13,000 being sold over the counter at the treasurer's office. The unsold 5 per cents, which have not been offered yet, include \$1,892,000 of city hall and civic center bonds, \$136,000 of garbage disposal bonds and the new issue of \$3,500,000 of municipal railway bonds.

City Bonds Not Exempt from Tax.

Columbia, S. C.—Comptroller-General Jones has given the opinion that the city of Columbia bonds held by a bank are not exempt from taxation. The opinion was given upon request of the Carolina National Bank of Columbia. A law was cited showing an apparent exemption. The comptroller held that if the bonds are held by an individual they are exempt from taxation.

STREET CLEANING AND REFUSE DISPOSAL

Hotels Pay Garbage Expenses.

Erie, Pa.—The garbage department, recently organized, has been made \$1,844.23 richer, the result of the signing of the ordinance by Mayor Stern, which turned into the coffers of the department all money earned by the mules which were rented from July 15 to Nov. 1. A lack of tanks has handicapped the department to some extent, but thirty new tanks, which will be manufactured by the Sims Company, will be ready for delivery in two weeks and will facilitate the handling of garbage in the city. Restaurants and hotels will be given especial attention by a special wagon which will make daily collections. The business houses which ask the special service will pay their share of the expense of operating it.

Campaign for Clean Streets Successful.

Altoona, Pa.—Superintendent W. H. Fields, of the city department of highways, stated that the results that have followed the clean-up week have been gratifying and that it has increased the efficiency of the street cleaning division at least 50 per cent. According to Mr. Fields the tangible results of the campaign of education are apparent in every part of the city, but especially along the business thoroughfares and about the school buildings. The garbage cans are now used much more extensively than heretofore. Before the crusade was inaugurated the cans were emptied once a week; now it is necessary to empty them twice a week and the need for more of them in various parts of the city is very apparent. There are 60 of them, and Mr. Fields says the number should be doubled. As a result of the campaign there is much less littering of the streets which makes less work for the sweepers, enabling them to cover more ground in a given time.

Dumping Leaves on Paved Highways Prohibited.

Dowagiac, Mich.—The practice of heaping leaves on the paved streets of Dowagiac for the city teams to haul away will be stopped, as Mayor Herold has issued orders to the city employes not to pay further attention to them while the ordinance prohibiting dumping of rubbish on the public thoroughfares will be enforced. Property owners whose places front on the unpaved streets may dispose of the leaves by burning them, but this is prohibited on the paved streets, and residents thereon are put to some trouble to dispose of the accumulation. When they are raked into the street and left they are carried by the first rain down the gutters and into the catch basins of the sewers, put-

ting the city to a great expense to remove the obstructions and may eventually entirely clog the mains. A number of residents have constructed leaf burners from fence wire, which hold a large quantity of leaves and prevent their blowing about while ablaze.

Citizens Against Council on Garbage Law.

Oshkosh, Wis.—Defeated before the Common Council in a campaign over the passage of the municipal garbage law, residents of Oshkosh have appealed to the state board of health to ascertain by what legal means the ordinance can be submitted to a vote of the people. The question has been put up to Attorney General Owen. Mr. Owen held that if the special election is desired petitions calling for it must be signed by 25 per cent of those who vote for governor. If signed by less than that number the question shall be submitted at the next general election. The question was asked as to whether women could circulate the petitions and the attorney general holds that the petitions must be circulated by a voter, but there is no objection to a woman accompanying a voter.

RAPID TRANSIT

Traffic Rules for Street Cars.

New Bedford, Mass.—An amendment to the traffic ordinance has been recommended to the city council by Mayor Ashley, who believes that the traffic policeman at the corner of William and Purchase streets should be given authority over the electric cars of the street railway company as well as over all other vehicles. Mayor Ashley has found that according to an act passed by the last legislature. It is necessary to specify in the traffic ordinance that the traffic officers shall have jurisdiction over the electric cars before they are authorized to over-rule the orders of the official starters. The amendment to the traffic ordinance is the result of several clashes of authority between the traffic officer at Purchase and William street and the car starter, and Mayor Ashley proposes that the police officer shall be given the whole authority on the corner. Mayor Ashley says there is no reason why the traffic officer and the starter cannot work together in perfect harmony, but he thinks the officer might be able to act as car despatcher just as well as the present employees of the company can. There is no friction whatever between the car company and the city.

Montreal Contemplates Large Transit Improvements.

Montreal, Canada.—Many miles of new tram tracks and from 12 to 14 subways and overhead bridges are involved in the tramways report, which has been placed in the hands of the controllers. If the miles of tramway tracks are constructed, as the aldermen suggest, and which are embodied in the preliminary report prepared by Mr. G. R. Macleod, municipal and tramways engineer, and transmitted by the chief engineers to the board of control, an expenditure of \$2,000,000 would be required. As a consequence of the construction of the new car lines, it is also stated that a number of subways and overhead bridges will also have to be constructed, adding another \$1,000,000 to the outlay, making a total of \$3,000,000 and perhaps \$3,500,000.

Propose Extensive Subways for Chicago.

Chicago, Ill.—The City Council has authorized an advertisement for proposals to construct a comprehensive system of passenger subways, within the city limits, that will be operated independently of existing surface and elevated transportation lines, and that will be ultimately municipally-owned, through the amortization of the construction debt out of earnings. The ordinance authorizing these invitations to private capital, to enter into a subway construction partnership with the City of Chicago, specifies certain subway routes that approximate fifty-seven miles in extent, or approximately 135 miles of single track, for which the construction estimates approximate \$96,000,000 for subway construction, and \$34,000,000 for equipment, or an estimated total of \$130,000,000. The bids are also to specify what proportion of gross receipts shall be applied to a sinking fund to amortize the construction debt; rate of division between company and city of the remaining

gross receipts, after providing for operating expenses, interest on investment and sinking fund. As the city's grant of operating privileges is limited, by statute, to twenty years, it follows that a liquidation of the construction debt will be based on the prospective subway earnings during the twenty-year operating period. It is provided that any proposal for the construction and equipment of a comprehensive system of passenger subways, in the City of Chicago, must be accompanied by a deposit with the City Treasurer of \$1,000,000, in cash or securities. The City Council has further directed, in the ordinance above mentioned, that on the receipt of proposals for the construction of a comprehensive system of subways, the same shall be canvassed, and if any proposal is acceptable by the City Council, it shall be incorporated in a second ordinance, containing, in substantial form, the detailed requirements of the first or preliminary ordinance; and that the second ordinance, containing the name of the person, firm or corporation whose proposal has been accepted, shall be submitted to a referendum vote of the citizens of Chicago, at the municipal election in April, 1914. At the election, it is proposed to give the citizens of Chicago an opportunity to express their preference for one of three alternative plans, for beginning the construction of passenger subways in Chicago, as follows:

1. For a comprehensive system of through-route, high-speed passenger subways, extending approximately to the city limits on three sides, to be built by private capitalists, named in the ordinance, on such terms of partnership with the City as will secure the gradual liquidation of the construction debt out of earnings, leaving the actual subways municipally owned, and providing for the future transfer of operating equipment to the City, or a new lessee, at the end of a twenty-year operating period.
2. For a limited system of passenger subways, in the downtown district, to be built by the municipality itself, out of present and future accumulations in the "traction fund"; such city-owned subways to be leased to the present owners of Chicago's elevated railroads for the latter's exclusive use, as a downtown clearing house for the elevated railroad system.
3. For a limited system of passenger subways, in the downtown district, to be built by the municipality, out of the "traction fund," possibly supplemented by direct financial aid from the surface car companies, as suggested in the 1907 traction ordinances; the said downtown subways to be used exclusively for the routing of a proportion of surface car traffic.

It is expressly provided, in the first "comprehensive subway" ordinance, that the second "comprehensive subway" ordinance, when submitted to the voters at the April election, shall become a law only if it secures a majority of the votes cast thereon; if it secures a greater number of votes than the votes cast in favor of the elevated road subway ordinance; or if it secures a greater number than the votes cast in favor of the surface car subway ordinance. In the last two mentioned plans for beginning subway construction in Chicago, there is no necessity for competitive proposals, and the operating terms to be arranged, if either plan is chosen by the voters, are confined to the elevated railways in one case, and to the surface railways in the other case. This leaves the first-mentioned alternative plan—that of a comprehensive, city-wide system of subways, as the only plan in which competitive proposals are invited.

Lima Citizens Build Own Street Car Line.

Lima, O.—A company capitalized at \$100,000 has been organized by Lima citizens to build a street car line to compete with the city railway, as a result of differences between the latter corporation and citizens over the fare charged with the service furnished.

MISCELLANEOUS

Municipal Stables for Lynn.

Lynn, Mass.—Just before Commissioner of Public Property Herbert C. Bayrd leaves his office he will tender to the city of Lynn the new municipal stables, free from all entanglements, and ready for occupancy. By the time they are finished the new stables will have cost the city roughly \$75,000, or just about three-fourths of the money which the State legislature permitted the city of Lynn to borrow for the purpose. Commissioner Bayrd authorizes the statement that with the money which is left over another set of auxiliary city stables will be built, exclusively for the

street department. The stables are built on strictly modern lines and permit of use as a garage when the horses are no longer used. There are three floors in the main building. The first will be devoted to the shops, the second horses and the third, hay and grain. The building is absolutely fireproof and allows a quick exit, in case of any trouble, by roomy runways. The stables will accommodate 120 horses comfortably, all on the same floor. The roomy sheds on the sides of the buildings will shelter the wagons and other municipal equipment.

Extensive Plans for Municipal Ventures.

Edmonton, Alta.—Official announcement is made that the city of Edmonton has sufficient funds, as the proceeds of its bond issues amount to \$11,800,000, of which more than \$9,135,000 has been paid to date by English bankers, to complete its construction program this year. The debts of the council of 1912 have been paid and the municipality's credit is gilt-edge. The city has \$3,500,000 worth of unsold debentures on hand. These issues and \$10,000,000 worth of bonds, the amount of money required for 1914, will be placed on the market early next year. The city of Edmonton, which owns and operates all public utilities, has \$16,000,000, invested in its street railway, telephone, light, paving, incinerator, water and other systems, which returned net earnings of \$60,000 last year. Though costly extensions have been made this year, it is expected that the utilities will show gains for 1913.

City Has Right to Mine Coal.

Denver, Col.—That the city of Denver can mine and supply coal to its citizens to relieve a distressing condition of affairs was the opinion of City Attorney I. N. Stevens. He has informed the city council that if a scarcity in coal endangers the health of the community that body may take such measures as may be necessary for relief. Stevens gave his opinion in answer to a request sent him by the Public Utilities Commission. According to the city attorney the city and county of Denver has the legal right to engage in the coal business in any manner it sees fit, provided it does not conduct the business for profit. The city may buy coal by the ton or trainload and retail it to the people or may lease, buy or operate a mine, supplying coal to the people. The only restriction pointed out is that the fuel be sold at no more than its actual cost per ton as mined and transported by the city. For mining the coal or obtaining it for public use, the city attorney holds that the money may be appropriated from any city fund to meet an emergency such as he holds now exists. The opinion of the city attorney makes possible the purchase of coal mines which F. E. Gove, counsel for the Victor-American Fuel Company, said would be sold at an appraised valuation if the city desired to make the purchase.

Plan Municipal Abattoir.

Pittsburgh, Pa.—A plan for the use of the old Northside pumping station, which will shortly be abandoned, as the site for a municipal abattoir, has been broached by Councilman W. A. Hoeveler at the meeting of the Councilmanic committee. The slaughter houses of the city are practically without inspection as to the character of the animals killed except in the cases of the very large ones. A municipal plant in which the killing would be done without cost to the butchers would obviate this danger and to some extent reduce the cost of living.

Opposed to New Park in Chicago.

Chicago, Ill.—Members of the Chicago Park Commission have appeared before Secretary Garrison at the War Department to press their request for unrestricted permission to occupy certain property fronting on Lake Michigan for park purposes. The petitioners explained to Mr. Garrison the desirability of extending Chicago's park system by taking in eight miles of lake frontage. The army engineers contend that this would render the construction of an up-to-date commercial pier on Lake Michigan impossible within the limits of Chicago.

LEGAL NEWS

A Summary and Notes of Recent Decisions— Rulings of Interest to Municipalities

Obstruction in Navigable Waters—City's Liability.

Kitsap County Trans. Co., Inc., v. City of Seattle et al.—As a general rule, a city is not liable for injuries caused by an obstruction in navigable waters within its boundaries, unless the duty to keep such waters open and free from obstruction has been expressly imposed upon it by statute.—Supreme Court of Washington, 135 P. R. 476.

Highways—Abandonment—Nonuser.

Village of Bronxville v. Lawrence Park Realty Co.—The statute, providing that highways which have ceased to be traveled or used as highways for six years shall cease to be highways for any purpose, applies only to highways, or longitudinal portions thereof, that cease to be used for their entire width, and has no application to encroachments or nuisances in the highway.—New York Supreme Court, 143, N. Y. S., 785.

Highways—Drainage—Injury to Property.

Burnham v. Town of Windham.—That plaintiff's drain, constructed as an outlet for water that might get into her cellar, has served no useful purpose for many years, did not show that it was unreasonable for her to maintain it as a part of the construction of her house; and hence defendant town, having notice of the existence of the drain, was bound to consider it in constructing and maintaining its highway. Supreme Court of New Hampshire, 85 A. R. 701.

Water Works Construction—Authority of Engineer.

Incorporated Town of Stonewall Okla., v. Stone.—Where plaintiff built a water works system for defendant town in accordance with plans and specifications furnished by an engineer employed by the town, he was not bound to inquire into the limitation on the engineer's authority; and in an action to recover a balance due on his contract, the contract between the town and engineer is immaterial, in the absence of proof that plaintiff knew of any departure therefrom by the engineer.—United States Circuit Court of Appeals, 207, F. R., 540.

Injury by Rioters—Business Houses.

Wells Fargo & Co. v. Mayor and Aldermen of Jersey City.—The general and continued acquaintance of both the legal profession and laymen in the assumption that statutes imposing liability on municipalities for the destruction of property by mob violence did not extend to business losses does not carry the force of judicial or legislative construction, but it is not without weight in the construction of a similar statute.—United States District Court, 207 F. R.,

Injunction—Smoke, Gas and Noise.

City of Pana v. Central Washed Coal Co.—There is no general rule for the granting of an injunction against a business, lawful in itself, but injurious to the health or comfort of the neighborhood by reason of smoke, gas or noise; but if, under the circumstances and in that locality, the business is so offensive to ordinary persons, not of delicate sensibilities, as to interfere materially with ordinary physical comfort, an injunction may be granted. Supreme Court of Illinois, 102 N. E. R. 992.

Nuisance—Regulation of a Plant.

People ex rel. Lincoln Ice Co. v. City of Chicago et al.—A municipal ordinance prohibiting the erection and maintenance of an icehouse or cooling plant within 400 feet of any hospital, church or school cannot be justified under Cities and Villages Act authorizing a municipality to prohibit any offensive and unwholesome business and to compel the owner of any grocery store, soap or tallow chandlery, etc., to cleanse, abate or remove the same; the business of making or selling ice not being an unwholesome trade and not being specifically mentioned in the statute. Supreme Court of Illinois, 102 N. E. R. 1039.

Electric Lighting Wires—Negligence.

Sykes v. Village of Portland et al.—Where danger developed from sagging telephone wires, strung over high tension electric light wires, owned by a village, it was the duty of the village officers in charge of its plant to remove the danger, if possible, or cause the same to be removed by the telephone company, without reference to the fact that the village was first on the ground and its poles and wires were in position under legal authority, when the franchise, or the construction of the telephone system was granted.—Supreme Court of Michigan, 143 N. W. R., 326.

Sidewalks—Ice and Snow.

Varney v. City of Covington.—Where ice was formed by rain or melting snow which ran down a fire escape on the side of a building and from a coping in the rear of the building, but it did not appear that there was any defect in the construction or condition of the walk itself or of the adjoining building which caused the water to flow or stand on walk at the place where plaintiff slipped, or that the water flowed or stood there in unusual quantities and there was no other defect than mere slipperiness, the city was not liable. Where a city permits ice to accumulate on a sidewalk in such ridges or inequalities as are liable to trip pedestrians and constitute an obstruction to travel, the city, in case of resulting injury, will be liable provided it has knowledge, actual or constructive, of the obstruction.—Court of Appeals of Kentucky, 160, S. W. R., 173.

Change of Grade—County and City Streets.

Gernert v. City of Louisville.—The Legislature has the power to define the limits of cities and towns and it may extend the boundaries whenever public necessity so requires; persons holding their property subject to the legislative power to define what shall be urban property and what shall be county property. Where the boundaries of a municipality are extended so as to take in county property and an old public highway, the construction of a street upon such a highway is an original construction rendering the property owners liable for the cost, and one whose property is injured by change in the grade of the old highway is without redress.—Court of Appeals of Kentucky, 159, S. W. R., 1163.

Building Ordinance—Retroactive Operation.

Barrett Mfg. Co. v. City of Chicago.—Before it was amended an ordinance did not purport to regulate the erection of buildings for the storage of coal tar, but it was afterwards amended so as to include such buildings. Before the amendment became effective, complainant, acting under a permit, had completed the removal and installation of two of the three tanks for storing coal tar and only a small part of the roof of the third remained to be completed, and under another permit a contract amounting to \$25,000 had been made for the construction of coal tar tanks, the foundations had been laid, considerable work done, and a large part of the material had been delivered on the premises and all of it purchased. Held, that the amendment was not intended to apply to buildings undertaken and completed to the extent of those in question, so that it would not be applicable to prevent their erection. Supreme Court of Illinois, 102 N. E. R. 1017.

Curb and Gutter—Variance from Plan.

City of Chicago v. Weber et al.—A resolution for the improvement of certain streets provided for combined curb and gutter on the sides of the several alley intersections from the property line to the street gutter. In the ordinance that portion of the upper surface of the so-called gutter next to the property line was described as sloping from the curb toward the middle of the alley return instead of being so constructed as to carry the water down the gutter parallel with the curb, so that the end of the gutter next to the property line and for a few feet toward the street was flattened out so that the water ran away from the face of the gutter instead of flowing down the side. Held, that there was no prejudicial variance between the resolution and the ordinance in that the work as constructed was not properly described as a combined curb and gutter because the water did not flow parallel with the curb the full length thereof. Supreme Court of Illinois, 102 N. E. R. 1001.

NEWS OF THE SOCIETIES

Calendar of Meetings.

December 2-5.
AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Annual meeting, New York City. Calvin W. Rice, Secretary, 29 W. 39th St., New York City.

December 3-5.
NATIONAL HOUSING ASSOCIATION.—Third National Conference, Cincinnati, O. John Ihlder Fuld, Secretary, 105 East Twenty-second street, New York City.

December 8-11.
ASSOCIATION OF AMERICAN PORTLAND CEMENT MANUFACTURERS.—Annual meeting, New York City. Percy H. Wilson, Secretary, Land Title Building, Philadelphia, Pa.

December 9-12.
AMERICAN ROAD BUILDERS' ASSOCIATION.—Annual Convention, First Regiment Armory, Philadelphia, Pa. E. L. Powers, Secretary, 150 Nassau street, New York City.

December 10-13.
AMERICAN INSTITUTE OF CHEMICAL ENGINEERS.—Annual meeting, New York. J. C. Olsen, Secretary, Polytechnic Institute, Brooklyn, N. Y.

January 10.
MUNICIPAL ENGINEERS OF THE CITY OF NEW YORK.—Eleventh Annual Dinner, Hotel Savoy. George A. Taber, Secretary, 29 West 39th St.

January 16.
AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—Annual meeting, New York City. J. R. Wemlinger, Secretary, 11 Broadway, New York City.

February 12-14.
NATIONAL CONFERENCE ON CONCRETE ROAD BUILDING.—Auditorium Hotel, Chicago, Ill. J. P. Beck, Secretary, 72 West Adams St., Chicago, Ill.

February 16-20.
NATIONAL ASSOCIATION OF CEMENT USERS.—Fourth Annual Convention, Chicago, Ill. Edward E. Krauss, Secretary, Harrison Building, Philadelphia, Pa.

Washington State Good Roads Association.

The fourteenth annual meeting was held at North Yakima, November 20, about 500 delegates being present. President John Hartman, Seattle, at the opening session made a plea that politics be suppressed and that real constructive road building be considered. Governor Lister in his address declared himself against bonding and stated that he thought a levy of one mill for state highways and a mill and a half for permanent roads a desirable figure.

The obligation or expenditure of \$348,000 on state roads during this year, up to November 1; getting in readiness for the opening of bids on state roads to cost \$149,000; and preparation of plans for bidders on roads to cost \$116,000 more, waiting only the securing of the right of way, were recounted as part of the work of his administration by the retiring state highway commissioner, W. J. Roberts. The figures are given in round numbers and include the expenditures on the Inland Empire highway in Walla Walla county, \$75,000; state roads Nos. 4, 10 and 12 in Chelan, Okanogan, Lincoln, Ferry and Lewis counties, with the Cowlitz bridge, \$82,000; the Pacific highway in Snohomish and Cowlitz counties, \$45,000; the Olympic highway, \$65,000; the National Park highway, \$27,000; the Sunset highway, \$44,000; and the McClellan Pass highway, King and Yakima counties, \$10,000.

Plans are ready for bidders on \$20,000 worth of construction on the Pacific in Lewis, \$25,000 worth in Cowlitz, and \$40,000 worth in Clarke; and on \$31,000 worth on the Sunset in Douglas.

Mr. Roberts said that 240 miles of new state roads are planned to be constructed from the funds available for the biennium, and that one of the features of the new work is the endeavor to eliminate grade crossings wherever feasible within the funds available.

"The greatest problem confronting us in the construction of new highways has been the securing of new rights of way," he said. "Land that is assessed at \$25 an acre suddenly jumps to \$1,000 an acre for right of way purposes; the old territorial roads have been reduced in width from 60 to 30 and even 20 feet; and I have observed cases in western Washington where the cost of protecting roads bordering rivers subject to freshets has been greater than the value of the farm protected. The right of way in these cases was readily granted."

Mr. Roberts cited the 33 measures affecting road progress in the state enacted by the recent legislature as an example of the widespread interest in the subject.

"We are proud of the 300 miles of hard surface roads already built, but it is the improvement of the 35,000 miles of earth roads in the state that demands our closest attention," he said.

There are 2,280 miles of "primary" highways planned, according to Commissioner Roberts. These include the Pacific, Blaine to Vancouver, 350 miles; Sunset, Seattle to Spokane, 400; Inland Empire, Ellensburg to Pasco, Walla Walla and Spokane, 530; Inland, Empire, eastern route, 130; Central Washington, Pasco-Spokane, 160; McClellan Pass, Auburn to North Yakima, 140; National Park, 220; and Olympic, 350. "Secondary" highways include a total of 981 miles.

Permanent highways completed to October 1, 1913, of all types from spread and rolled gravel through water or oil bound macadam to concrete or brick pavement have totaled 163.8 miles, have cost \$1,199,452, and have averaged \$9,608 per mile for all types; while permanent highways under contract October 1, of the same types, total 91.5 miles, will cost \$902,999, and will average \$10,521 per mile for all types.

The following officers were elected: President, Clyde L. Morris, Seattle; first vice-president, John McNeely of Enumclaw; second, M. Olsen of North Yakima; third, Jeff Munro of Spokane; fourth, E. E. Teachnor of Chehalis; treasurer, F. J. Wilmer of Rosalia.

Alabama Good Roads Association.

The annual meeting was held in Mobile, November 21. The most important action of the convention was the adoption of a resolution calling upon the

state legislature to place the state convicts upon public highways. John W. O'Neill, Birmingham, announced that it was his intention to introduce a resolution in the legislature for the consolidation of the convict department with the state highway department.

Washington League of Municipalities.

The annual meeting was held at Spokane, November 20-22. Among the papers read and topics discussed were the following:

Most of the first session was taken up with preliminary organization of the section conferences of the league, to which resolutions and questions are referred for answers. Austin Griffiths was made chairman of the mayors, councilmen and commissioners attending the gathering; James E. Bradford, corporation counsel of Seattle, was elected chairman of the city attorneys; W. S. McMorris of Seattle was chosen chairman of the engineers, and Mr. Gilman of North Yakima secretary. W. H. L. Ford was selected chairman of the financial and recording officials and Dr. Crichton of the health official gathering.

Resolutions indorsing the commission form of government for the state, minimum wage laws for all municipalities as well as the commonwealth, and the calling of a constitutional convention to draw up an entirely new constitution, besides the voicing of an attack on the state public service corporation by H. M. Stephens, corporation counsel of Spokane, were among the features of the second session.

"A commission form of government, or some modification thereof which will involve direct responsibility, continuous service of officials, non-partisan elections, frequent legislative meetings, and deliberate consideration of proposed legislation with ample opportunity for public hearings is desirable for the state of Washington, as a substitute for the present cumbersome, inefficient and unsatisfactory legislation and official bodies," the first resolution declared.

Dr. Herman A. Brauer of the University of Washington read a paper on municipal markets, describing procedure in other countries. He suggested that the rooms of buildings used for markets should be thrown open for playground purposes. As a means of preventing perishable commodities from being brought into the city when the supply is greater than the demand, he suggested that a daily bulletin of prices be published and sent out to the producers and the consumers.

Police Judge G. W. Stocker described his plan for a municipal farm for the minor criminals of the city, and the vagrants. "Spokane county is now trying a model farm for the county jail prisoners," he said. "By that system, I believe from long experience in police court practice, that an offender of the petty class can be given simple, out-of-door work, and sent away after his sentence stronger in body and mind, and with a few dollars in his pocket to prevent his again coming in contact

with the law. It is infinitely better than shutting him up in jail, with nothing to do except acquaint himself more thoroughly with the vice in which he is placed in contact. I also believe that indeterminate sentences should be given from police courts as well as from the courts which determine punishment of felons."

New England Water Works Association.

The following papers will be presented at the regular meeting of the association at the Hotel Brunswick, Boston, December 10:

"Rainfall," by X. H. Goodnough, chief engineer of the Massachusetts State Board of Health.

"On Flow in Bends," illustrated, by N. W. Akimoff, Philadelphia, Pa.

"Small Water Purification Plants, a Plea for their More Efficient Operation," by H. P. Letton, sanitary engineer, Washington, D. C.

Topical Discussion: "A Comparison of Methods Used to Locate Hidden Leaks in Underground Pipes with Special Reference to Pipe Whose Actual Location is Unknown."

Municipal Engineers of the City of New York.

The eleventh annual dinner of the Society will be held Saturday, January 10, at 7 p. m., at the Hotel Savoy, 5th avenue and 59th street.

At the regular meeting, November 26, Le Roy T. Harkness, assistant counsel, Public Service Commission, presented a paper entitled "The Dual Subway System in its Relation to the Rapid Transit History of New York." George A. Taber, 29 West 39th street, Manhattan, is secretary of the society.

Water Works Manufacturers' Association.

Secretary E. K. Sorenson recently received a letter from F. S. Purviance, secretary of the Pennsylvania Water Works Association, saying that a resolution was passed at the annual meeting at Atlantic City, N. J., last month, thanking the Water Works Manufacturers' Association for the fine exhibition of water works supplies and materials, expressing the great interest the representatives took in the same and expressing the hope that a similar exhibition would be given at the next annual meeting.

The office of the secretary of the Water Works Manufacturers' Association is 15 Broad street, New York City. Wm. C. Sherwood, of the Hershey Mfg. Co., is president; Oscar B. Mueller of the H. Mueller Mfg. Co., is vice-president, and Robert E. Milligan of the N. Y. Continental Jewell Filtration Co., is treasurer.

Smoke and Dust Abatement League.

The first annual meeting of the Smoke and Dust Abatement League will be held in the rooms of the Chamber of Commerce, Pittsburgh, Pa., Nov. 24.

The league was organized one year

ago for the purpose of bringing about co-operation, education and legislation for the abatement of smoke and dust in Pittsburgh and its metropolitan district. At the present time the following eight organizations are members of the league: Allegheny County Medical Society, Oakland Board of Trade, Civic Club of Allegheny County, Twentieth Century Club, Carnegie Institute of Technology, Consumers' League of Western Pennsylvania, Chamber of Commerce and University of Pittsburgh.

The first society in this country with a purpose similar to that of the league was the Society for the Prevention of Smoke, which was organized in Chicago, Ill., in 1891. It was an organization of citizens entirely separate from the city government, desirous of having Chicago present as clean an appearance as possible to the visitors to the World's Fair. The society employed an engineer who advised the owners of plants in regard to the details of their boiler furnace. The society also employed an attorney who brought suits for violation of the smoke ordinance. The expenses of the society were borne entirely by private citizens who were interested in the work. It is interesting to note that Bryan Lathrop, the president of the society in 1891, is today a member of the Smoke Abatement Commission of Chicago. This commission has placed Chicago in the front rank in real smoke abatement work.

PERSONALS

Bonnell, R. A., Lewiston, Idaho, has been appointed city engineer, succeeding D. C. Wrighter, resigned.

Flood, W. J., assistant city engineer of Butte, Mont., has been appointed temporary superintendent of public works, succeeding Paul A. Gow, resigned.

Fox, Richard T. general manager of the Citizens Street Cleaning Bureau of Chicago, has been asked to sit with the city expenditures commission and act as its expert while the investigation of the Bureau of Streets is being carried out.

Harnsberger, George L., Springfield, Ill., engineer for the Park Board, has been appointed superintendent succeeding Frank Maspherson, resigned.

May, Ross R., has been made assistant city engineer of Butte, Mont.

Roche, Thomas M., Chicago, Ill., formerly with the American Asphaltum and Rubber Company, has been appointed Western sales agent for the United States Asphalt Refining Co., with headquarters in the Monadnock Block, Chicago, Ill.

Stephenson, F. H., formerly assistant engineer with the Filtration Division of the Department of Water Supply, Gas and Electricity, New York City, has been appointed assistant en-

gineer of the proposed filter plant for the city of Cleveland.

Sweetser, C. H., Lake Charles, La., has been appointed highway engineer of Calcasieu county, Louisiana. He will have charge of the expenditure of \$900,000, the proceeds of a bond sale.

Tull, Reid, resident engineer of the Greenville, Spartanburg & Anderson Railway, has been appointed city engineer of Spartanburg, S. C.

The following officers have recently been elected.

WASHINGTON.

Vancouver—Mayor, Henry Crass; city clerk, Chas. Hasson.

PENNSYLVANIA.

Hanover—Burgess, H. M. Stokes.

Beaver Falls—Burgess, James E. McClure.

South Bethlehem—Mayor, Mitchell Walter.

Meadville—John E. Reynolds.

OREGON.

Bay City—Mayor, W. H. Gilmore.

Woodburn—Mayor, J. R. Landon.

CONNECTICUT.

Bridgeport—Mayor, Clifford B. Wilson.

COLORADO.

Grand Junction—Mayor, C. E. Cherington; water commissioner, Frank Carson.

Pueblo—Commissioners, John T. West, J. K. Burton.

TENNESSEE.

Wartrace—Mayor, W. T. Cunningham.

NEW HAMPSHIRE.

Concord—Mayor, Charles J. French.

MICHIGAN.

Port Huron—Mayor, John L. Black; commissioners, George L. Ernest, David T. Monteith, Otto L. Hill and James H. Green.

NEW JERSEY.

Hightstown—Mayor, Richard D. Norton.

Tenafly—Mayor, Byron Huyler.

Fort Lee—Mayor, Edward A. White.

Fairview—Mayor, Charles Lyons.

Edgewater—Mayor, Henry Wessel.

Cliffside Park—Mayor, August E. Neumann.

Bogota—Mayor, Wm. N. Smith.

Lodi—Mayor, John J. Geoghegan.

Maywood—Mayor, David A. Speight.

Audubon—Mayor, George L. Brown.

MINNESOTA.

Crookston—Mayor, Tom Morris.

KENTUCKY.

Louisville—Mayor, John H. Buschmeyer.

Frankfort—Mayor, Joseph Rupert.

Owensboro—Mayor, Dr. J. H. Hickman.

Henderson—Mayor, J. W. Johnson.

Earlington—Mayor, W. E. Rash.

Clinton—Mayor, E. B. Walker.

Fulton—Mayor, R. M. Chowning.

Bowling Green—Mayor, A. Y. Patterson.

Lexington—Commissioners, K. G. Pulliam, C. H. Wilkerson, W. B. Hunt, James T. McCarty.

WEST VIRGINIA.

Bridgeport—Mayor, Mr. Shaffer.

Brookside—Mayor, A. H. Young.

Martin's Ferry—Mayor, Mr. Wyckoff.

Bellaire—Mayor, Mr. Wassman.

NEW APPLIANCES

A PORTABLE LOADING MACHINE.

Link Belt Company Makes Practical Machine for Reducing Labor in Handling Contractors Materials.

A portable loading and screening equipment, primarily designed for reclaiming stone from spent macadam roads, has been satisfactorily and economically used by the Cranford Company, of Brooklyn, for whom it was manufactured by the Link-Belt Company. The machine consists of a bucket elevator, a rotary screen and two chutes, operated by chain and sprocket driven by a 9 H. P. gasoline engine, and the whole mounted on a steel frame work of angle sections sup-

porting it directly into the dump carts. The machine is so arranged that the belt-conveyor trailer at the foot and the rotary screen and the chutes at the head can be taken off the portable elevator frame and a direct chute placed under the head of the elevator, so that the machine can be used for loading concrete materials, such as crushed stone and sand, from storage piles to carts.

The Contracting Company finds that with three men on the stone pile and a fourth to operate the clutch and control the loading, 2-inch stone can be handled from the ground storage pile to auto trucks at the rate of about 35 tons an hour. This is a saving of about 60 per cent. over the hand-shoveling

which is built by the Link-Belt Company of Philadelphia, for handling coal, sand, etc., where capacities up to 70 tons an hour could readily be maintained.

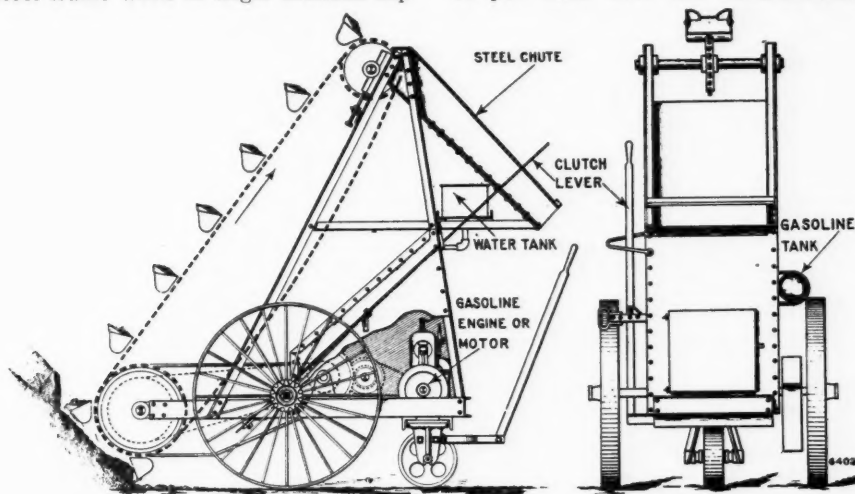
Portable Wagon Loaders of this general type are fast coming into prominence for handling sand and gravel; because of the fact that this material flows more readily than stone, large capacities can be obtained without increasing the size of the machine.

TANDEM MOTOR ROAD ROLLER

Tandem Machine Added to Austin Motor Roller Line.

The Austin-Western Road Machinery Co., 910 South Michigan avenue, Chicago, Ill., have placed on the market a five-ton tandem gasoline road roller. This motor roller is claimed to have many advantages over the steam style of tandem. The difficulties of obtaining water and of keeping up steam when working hard with bad draft conditions too familiar at times to the contractor, are eliminated. As the center of gravity is low it runs smoothly and steadily. The motor is of the double cylinder horizontal opposed type. The roller has two gear speeds and a power steering device.

The following are the dimensions of the five-ton machine: Length over all, 170 inches; width over all, 54½ inches; height over all, 69 inches; diameter rear roll, 46 inches; diameter front roll, 33 inches; width of rolls, 42 inches; clearance under frame, 11 inches; gasoline tank capacity, 25 gallons; sprinkling tank capacity, 60 gallons; cooling tank capacity, 100 gallons; road travel in low gear, 2¼ miles; road travel in high gear, 3½ miles; two cylinder opposed motor; two speeds forward, two speeds reverse; both power and hand steering gear; all gears and motor completely enclosed.



PORTABLE WAGON LOADER.

ported by four iron wheels. A tongue attached to the axle of the small front wheels allows the machine to be moved by hand or as a trailer to a wagon. A belt-conveyor trailer forms part of the equipment when used on work requiring the machine to be frequently moved. This trailer is a two-wheeled affair with a wagon like body, the bottom of the body being an endless belt somewhat cupped.

In repaving work the old macadam is first thoroughly loosened by plowing. Ten or twelve men with shovels then deposit the old road material in the belt-conveyor trailer attached to the foot of the elevator, which in turn feeds the dirt and stone to the rotary screen at the head. Under the screen are the two chutes, one collecting the dirt and fine materials which is screened out and delivering it to carts drawn up along one side of the loader. The other chute collects the clean stone coming off the end of the screen and passes it out on the other side of the loader. This stone may again be used for concrete purposes.

One advantage in the use of the loader is that the men shoveling the loosened macadam into the trailer do not have so high a lift as if they were

method, as well as an economy in the time of the truck. The men on the pile use rakes to agitate the stone and keep it flowing to the foot of the elevator, where the buckets pick it up and discharge it to the carts through the direct chute.

This machine is the outgrowth of the Portable Wagon Loader, a device



AUSTIN TANDEM MOTOR ROLLER.

INDUSTRIAL NEWS

Cast Iron Pipe.—Chicago. Municipal lettings are unimportant. Quotations: 4-inch, \$27; 6 to 12-inch, \$25; 16-inch and up, \$24. Birmingham. No change in prices is noted. Quotations: 4-inch, \$22; 6-inch, \$20. New York. Low prices are being made on public lettings. Private buyers are sounding the market for spring deliveries but are slow to buy. Quotations: 6-inch, \$23.

Lead.—Market is weak. Quotations: New York, 4.30c. St. Louis, 4.15c.

Garbage Collection and Disposal.—Chairman Willis O. Nance, Chicago waste commission, was authorized to close a contract with Irwin S. Osborn and John F. Fetherston to submit a plan for handling and disposing of Chicago's garbage and waste.

Legal Forms.—Bulletin No. 654, of the Bureau of Municipal Research, 261 Broadway, New York City, makes a comparison of a model legal form and an old-fashioned redundant form. The new form consists of 60 words, the old one of 900. The moral of the bulletin is contained in the following question: Would it not be profitable to apply this reduction to essentials principle to the forms, reports and procedures of your city's business?

Dayton Airless Tires.—Referring to the motorization of the Des Moines, Ia., fire department, it was stated in some publications that the new apparatus would be equipped with solid tires. This was a mistake as the Dayton Airless tires will be used throughout. In the minds of many people the idea prevails that there are two kinds of automobile tires, solid and pneumatic. This classification, however, no longer holds, as the Dayton Airless is not a pneumatic tire and while made of a solid rubber it is built up like a bridge. Half of the space inside the tire is open, permitting the rubber piers to extend into the open spaces, when under load, then spring back into their original shape and position when the load is removed.

Consulting Engineer.—Walter H. Flood, recently chief chemist of the municipal asphalt plant, and engineering chemist, Bureau of Engineering, City of Chicago, announces the opening of his consulting laboratory, 326 River street, Chicago, Ill., where he will engage in a general chemical engineering practice. By reason of his long experience in both the engineering and manufacturing fields, Mr. Flood is enabled to render special service in the following lines: Testing and inspection of road materials, asphalts, tars, road oils, etc., paving specifications. Industrial application of bituminous products. Testing and inspection of engineering materials, coal, cement, lubricating oils, etc., engineering specifications. Analysis of food and food products. Manufacturing processes and industrial problems.

AZTEC ASPHALT.

Laid This Year on 150,000 Square Yards of Philadelphia Streets.

The Eastern Paving Company, Philadelphia, Pa., have laid about 150,000 square yards of standard sheet asphalt and bituminous concrete on the streets of Philadelphia this year. The organization and equipment were new. To accomplish so much under these circumstances was a difficult undertaking. Hence the method of operation is interesting.

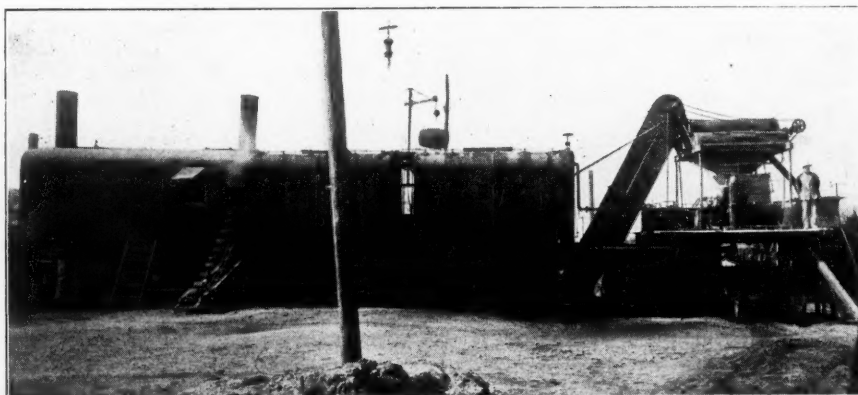
All work was laid on a concrete base, crushed pebbles from the river being the aggregate. Three Koehring

gutters. The character of the streets were residential, the houses on them being of the inexpensive class. Some of the streets have considerable heavy hauling.

In as much as Philadelphia was one of the first cities in the country to lay asphalt paving and has been laying it continuously ever since, the specifications are of interest.

Concrete is made 1:3:6. Careful provisions are made for inspecting the cement.

Either of two kinds of asphalt are allowed: Natural solid asphalt or asphalt derived from the distillation of asphaltic petroleum.



MERRIMAN PLANT AT 58TH ST. AND GRAY'S AVE., PHILADELPHIA.

14 cubic foot street paving mixers kept the concrete laid well in advance of the surface.

To lay the asphalt two one car railroad asphalt plants were used. A Merriman plant was located at 58th street and Gray's avenue and a Cummer plant at 3d street and American. In this way the whole area of operations was within reasonable hauling distance from one plant or the other, averaging about three miles. Two Mack five-ton trucks and teams hauled the asphalt mixture. The motor trucks made from six to eight loads in a ten hour day. Two street gangs laid the asphalt, each supplied by its own plant. Five and eight ton rollers were used. Some of the streets were paved with brick

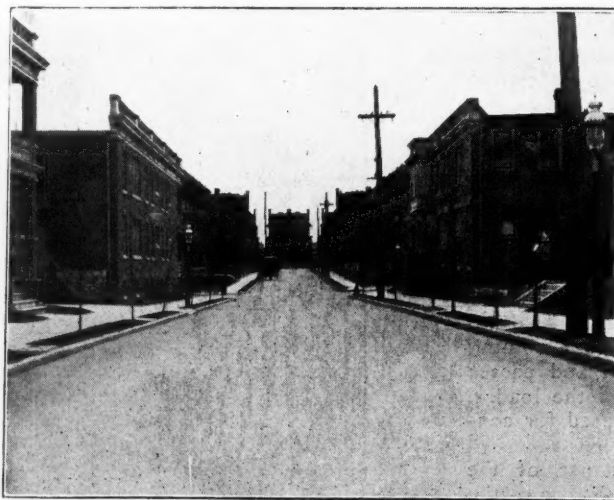
Crude natural solid asphalt is defined as any natural bitumen, either pure or mixed with foreign matter, from which through natural causes in the process of time the light oils have been driven off until it has a consistency harder than 100 penetration at 77 degrees F.

Other asphalt may be used produced by the careful distillation of asphaltic petroleum with continuous agitation until the resulting bitumen has a consistency not harder than 30 penetration at 77 degrees F. Samples heated to 325 for five hours must not lose over 5 per cent. in weight, nor the reading of the penetration test be less than half the original.

The binder is made of stone varying in size from one inch down and sand so that the resulting mesh composition will be; material passing No. 10 mesh sieve, 25 to 35 per cent.; bitumen, 5 to 8 per cent. of mixture.

The asphaltic surface mixture must contain 9.5 to 13.5 bitumen; dust, 10 to 15 per cent.; sand passing 80 sieve, 18 to 36; passing 40, 20 to 50; passing 10, 8 to 25; passing 4, 0 to 10.

Binder is laid one inch thick and surface two inches thick. It can be laid two days ahead.



FARRAGUT TERRACE, WALNUT TO LOCUST, PHILADELPHIA.

ADVANCE CONTRACT NEWS

ADVANCED INFORMATION BIDS ASKED FOR

CONTRACTS AWARDED ITEMIZED PRICES

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
STREETS AND ROADS				
N. J.	Long Branch	Dec.	8..Cement sidewalk	J. W. Potter, Boro. Clk.
Tex.	Ft. Worth	10 a.m., Dec.	8..Gravel road, 1 mile	J. M. Brown, Co. Judge.
Ill.	Dixon	2 p.m., Dec.	8..Concrete pavement, 1,100 yds.; concrete water way, 8,550 cu. yds.; vitrified brick, 1,716 yds.	M. C. Keller, Atty.
Pa.	Dorranctown	Dec.	9..Asphaltic concrete, 5 streets; brick, 1	Smith & Welles, Engrs., Wilkes-Barre.
Minn.	Granite Falls	Dec.	9..Gravel, 68,000 sq. yds., culverts, etc., \$51,670	S. O. Tjosvold, Co. Aud.
Ind.	Portland	10 a.m., Dec.	10..Roads in Knox and Jackson Twps.	J. Bonifaz, Co. Aud.
N. J.	Oceanville	11.30 a.m., Dec.	10..Gravel road	E. D. Rightmire, Co. Eng.
Ill.	Elgin	10 a.m., Dec.	10..Asphaltic macadam pavement, 42,852 sq. yds.; brick pavement, 2,424 sq. yds.	M. H. Brightman, City Eng.
O.	Youngstown	noon, Dec.	10..Grading two streets	W. McMillan, Clk.
Cal.	Sacramento	Dec.	10..San Diego-El Centro Road	A. B. Fletcher, Engr.
N. Y.	Brooklyn	11 a.m., Dec.	10..Sidewalks, sheet asphalt, asphalt blocks; 250 tons of refined asphalt; 50,000 wood paving blocks	L. H. Pounds, Pres.
Pa.	Chester	8 p.m., Dec.	11..Macadamizing various streets	J. Smith, Solicitor.
La.	Lake Charles	Dec.	11..Vitrified fibre brick paving, 38,000 yds.	G. L. Riling, Mayor.
Minn.	Duluth	2 p.m., Dec.	12..Rural Highway No. 4; cost, \$112,500	O. Halden, Co. Aud.
Mich.	St. Joseph	Dec.	12..Water bound macadam, 27 miles	W. J. Cleary, Co. Engr.
N. D.	Bismarck	8 p.m., Dec.	15..Grading	R. H. Thistlethwaite, City Aud.
Tex.	San Antonio	4 p.m., Dec.	15..Paving 11,000 sq. yds.	F. Fries, City Clk.
Ind.	South Bend	About Dec.	15..Grading, draining and paving	C. Sedgwick, Co. Aud.
Ind.	Indianapolis	2 p.m., Dec.	15..Free gravel road	W. T. Patten, Co. Aud.
Fla.	Jacksonville	3 p.m., Dec.	15..Asphaltic concrete, 22,430; vitrified block, 31,964 sq. yds.	L. D. Smoot, Chief Engr.
N. J.	Elizabeth	8 p.m., Dec.	15..Brick pavement, 3,040 sq. yds.; new curb, 1,210 lin. ft., etc.	W. P. Neafsey, Str. Comr.
O.	Carey	noon, Dec.	15..Paving 6,000 lin. ft.	D. C. Angus, Vil. Clk.
O.	Columbus	2 p.m., Dec.	16..Medium traffic brick in Paint Twp., .75 miles	J. R. Marker, St. Hwy. Comr.
O.	Columbus	2 p.m., Dec.	16..Water-bound macadam in Mill Creek, 2 miles	J. R. Marker, St. Hwy. Comr.
Ind.	Lafayette	Dec.	16..Creosoted blocks; cost, \$60,000	C. Richards, Co. Surv.
O.	Columbus	Dec.	16..Improvement of Angola Rd.	Jas. R. Marker, St. Hwy. Comr.
Ind.	Indianapolis	2 p.m., Dec.	16..Gravel roads	W. T. Patten, Co. Aud.
Ind.	Elwood	Dec.	18..Roads	City Engr.
Ind.	Greencastle	2 p.m., Dec.	20..Gravel roads, 8 miles	C. I. Airhart, Co. Aud.
O.	Cleveland Heights	Dec.	23..Brick, asphalt, macadam, etc., number of streets	H. H. Canfield, Vil. Clk.
Fla.	Tarpon Springs	Dec.	29..Hard surfaced highway	L. D. Vinson, Co. Comr.
Cal.	Oakland	Dec.	29..Tunnel and highway; estimated cost, \$250,000	City Council.
O.	Salina	Jan.	1..Macadam, 3 miles	R. D. Smalley, Co. Engr.
O.	Salina	Feb.	1..Macadam, 4 miles	R. D. Smalley, Co. Engr.
Ind.	Laporte	Feb.	2..Brick paving; cost, \$800	L. Drew, Engr.
SEWERAGE				
Neb.	McCook	6 p.m., Dec.	8..Septic tank; cost, \$3,000	L. C. Stoll, City Clk.
N. J.	Newark	2 p.m., Dec.	9..Section 3 of outfall pressure tunnel	J. S. Gibson, Clk., Passaic Val. Sew. Comrs.
Minn.	Tracy	8 p.m., Dec.	9..Sewer, 1,326 feet	L. J. Fitch, City Rec.
Ill.	Chicago	11 a.m., Dec.	9..Tile sewers, number of streets	E. J. Glackin, Sec.
N. Y.	Brooklyn	11 a.m., Dec.	10..Catch-basins	L. H. Pounds, Pres.
N. Y.	Brooklyn	11 a.m., Dec.	10..Storm sewers and sanitary sewers	L. H. Pounds, Boro. Pres.
O.	Youngstown	noon, Dec.	10..Sewers, two streets	W. H. McMillan, Clk.
La.	Lake Charles	10 a.m., Dec.	11..Storm sewer, 3 miles	G. L. Riling, Mayor.
Minn.	Blue Earth	1 p.m., Dec.	12..Ditch, 26,600 ft. 6 to 16-inch tile, etc.	R. B. Miller, Engr.
N. J.	Elizabeth	8 p.m., Dec.	15..Sewer construction	W. P. Neafsey, Str. Comr.
Brazil	Rio Grande do Sul	Dec.	15..Sewerage system	Sr. Coronel Intendente Municipal.
O.	Grand View Heights	Noon, Dec.	15..Sanitary sewers	B. W. Jones, Vil. Clk.
N. J.	Newark	Dec.	16..Section 3 of the Passaic Valley Trunk Sewer	J. S. Gibson, Clk., Passaic Val. Sew. Comrs.
Fla.	Tampa	Dec.	16..Sewage system	City Clerk.
O.	Canton	10 a.m., Dec.	17..Mohler ditch	C. L. Stoner, Clk.
O.	Canton	noon, Dec.	17..Sewage treatment plant	R. F. Harbert, Dir. P. Serv.
Ind.	Fort Wayne	Dec.	18..Drainage pumps	F. M. Randall, City Engr.
N. Y.	Brooklyn	Dec.	19..Sewers in several streets	L. H. Pounds, Boro. Pres.
O.	Mt. Vernon	Dec.	22..Sewer system and disposal plant, \$42,000	C. M. Fairchild, Dir.
O.	Cleveland Heights	noon, Dec.	23..Sewers	H. H. Canfield, Clk.
N. Y.	Rochester	11 a.m., Dec.	30..Sewer in Woodbine Ave.	F. X. Pifer, Sec.
O.	Nelsonville	about Jan.	1..6 to 14-foot sanitary sewer; estimated cost, \$85,000	Park Sniffon, Engr.
Kan.	Atchinson	About Jan.	1..Sewer, 4,000 ft. 6, 8 and 10-inch	F. L. Altman, City Engr.
La.	New Orleans	Jan.	6..Pumps, 1 centrifugal, 11 screw; discharge pipes, gates, &c.	G. C. Earl, Gen. Supt.
WATER SUPPLY				
O.	Columbus	noon, Dec.	8..Water main, 8-inch	J. Scott, Clk. Bd. Co. Comrs.
Wash.	Centralia	Dec.	9..Gravity water system	Frank Kelsey, Engr.
O.	Cleveland	Dec.	9..Fire hydrants	W. H. Kirby, Sec.
Ill.	Chicago	11 a.m., Dec.	9..Service pipes, several streets	G. A. Schilling, Pres.
Mo.	Hopkins	Dec.	10..Water works	Henrici, Kent & Lowry, Kansas City, Engrs.
Conn.	Hartford	3 p.m., Dec.	11..Cast-iron pipe, 650 tons 10 specials	F. D. Barry, Sec.
Ohio	Baltic	noon, Dec.	13..Complete water works system	W. D. Fisher, Clk. Board Pub. Affairs.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES
O., Grand View Heights.....	Dec.	15..	Water mains	B. W. Jones, Vil. Clerk.
Kans., Arma	about Dec.	15..	Water system	A. C. Moore, Engr, Joplin, Mo.
Brazil, Rio Grande do Sul....	Dec.	15..	Water works system	Sr. Coronel Intendente Mun.
Kans., Strong City.....	Dec.	15..	C. i. pipe, 190 tons; steel pipe; reservoir, pumps, etc.....	E. E. Harper, Kan. City.
Ill., Chicago.....	Dec.	17..	Centrifugal pump, 5,000,000-gal. cap.....	J. F. Neil, Sec. So. Pk, Comrs.
Kan., Westmoreland ..6 p.m.,	Dec.	17..	Deep well pump, oil engine, tank and tower.....	H. G. Huckstadt, Mayor.
N. J., Atlantic City.....	Dec.	18..	Constructing 48-inch cast-iron syphon.....	H. Bacharach, Dir.
Mont., Great Falls.....	Dec.	18..	Concrete irrigation canal	U. S. Reclamation Service
New Zealand, Hastings.....	Dec.	18..	Turbo pumps, motors, suction pipe, etc.....	Town Clk.
Brazil, Therezopolis	Dec.	23..	Water works and sewage systems	Municip'l Cham., Therezopolis.
O., Cleveland Heights.....	Dec.	23..	Water main, 6 and 8 inch.....	H. H. Canfield, Clk.
Fla., Pensacola	2 p.m., Dec.	29..	Air compressor	A. Greenhut, Mayor.
N. Y., Williamson	Jan.	1..	Water works, cost \$70,000	H. C. Kittredge, Engr., Roch- ester.
Kans., Lakin	Jan.	1..	Digging of artesian well	Kearney Co. Comrs.
Ind., Mitchell	About Jan.	1..	Water and electric light plant.....	A. H. Kennedy, Rockport.
La., New Orleans.....	noon, Jan.	6..	Pumps and other water supplies	F. S. Shields, Sec. Sew. & Wat. Bd.
Mont., Columbus	Jan.	12..	Water works	G. A. Westover, Twn. Clk.
Neb., Bruning	Jan.	15..	Water works and lighting plant.....	G. G. Bruckert, Vil. Clk.
la., Winfield	About Jan.	15..	Water system	J. O. Kilbourne, City Clk.
LIGHTING AND POWER				
Ind., Mishawaka	Dec.	8..	Electrical supplies	O. Wenderoth, Supv. Archt., Washington, D. C.
O., Lima	Dec.	8..	Electric generating plant and wiring	H. J. Lawler, Co. Clk.
D. C., Washington	Dec.	8..	Wiring, lighting fixtures, etc., at Port Huron, Mich.; also conduit and wiring system at Evansville.....	O. Wenderoth, Supv. Arch.
la., Independence	Dec.	8..	Boilers, two 150 h. p. each.....	E. D. Warren, Supt.
O., Columbus	Dec.	9..	Mechanical stokers	F. B. Kempner, Clk. Dir.
O., Cleveland	Dec.	10..	Distribution switchboard and equipment	W. J. Springborn, Dir. P. S.
Can., Winnipeg	Dec.	11..	Electric induction meters	J. G. Glassco, 54 King St.
Minn., Minneapolis ....3 p.m.,	Dec.	12..	Gas and electric street lighting.....	N. N. Nott, Clk.
Kans., Arma	about Dec.	15..	Electric light plant	A. C. Moore, Engr., Joplin, Mo.
Tex., Corpus Christi	Dec.	15..	Street lighting	City Engr.
Tex., Marlin	Dec.	16..	Electrical equipment of P. O.....	O. Wenderoth, Wash., D. C.
Colo., La Junta.....	Dec.	16..	Electrical equipment of P. O.....	O. Wenderoth, Wash., D. C.
Miss., Natchez	5 p.m., Dec.	17..	Lighting streets for five years.....	Mayor.
Mo., St. Louis.....	Dec.	20..	Conduit and wiring system.....	O. Wenderoth, Supv. Archt., Washington, D. C.
Ga., Atlanta.....	11 a.m., Dec.	20..	Lighting fixtures and lamps.....	S. Smith, Ch. Road Comm.
D. C., Washington	Dec.	20..	Conduit & lighting fixtures, Custom House, St. Louis, Mo..	Supv. Arch.
Can., Yorkton	Dec.	22..	500 D. H. P. combined unit.....	M. M. Inglis, Elec. Engr.
N. J., Metuchen	8 p.m., Dec.	23..	Street lighting for five years.....	H. S. Wilson, Bor. Clk.
D. C., Washington	Dec.	27..	Conduit & lighting fixtures, Post Office, Macomb, Ill.....	Supv. Arch.
Ind., Indianapolis	10 a.m., Dec.	29..	Lighting and heating Soldiers' Monument	G. B. Menzies, Pres.
Pa., Philadelphia	noon, Dec.	31..	Electric light fixtures, etc.....	E. L. Tustin, Recorder.
Ind., Mitchell	About Jan.	1..	Electric light plant.....	A. H. Kennedy, Rockport.
FIRE EQUIPMENT				
O., Wellsville.....	Noon, Dec.	6..	Motor combination apparatus	A. D. Fansler, Dir. P. S.
Pa., Allentown.....	10 a.m., Dec.	8..	Fire hose, 1,000 ft.; three play pipes; three tips.....	S. K. Fetterman, Ch. Comrs.
Ind., Ligonier	7.30 p.m., Dec.	11..	Public building, including hose house	R. E. Jeanneret, City Clk.
Can., Winnipeg	11 a.m., Dec.	15..	260 H.P. motor hose wagon; one 75 H.P. motor aerial ladder	M. Peterson, Sec. City Clk.
Wash., Everett	Dec.	22..	Motor triple combination apparatus.....	City Clk.
BRIDGES				
Kans., Kansas City...10 am., Dec.	6..	Reconstruction of Argentine Wagon Bridge.....	F. M. Holcomb, Co. Clk.	
Tex., Houston	Dec.	8..	Two small bridges	H. L. Washburn, Co. Aud.
Minn., Granite Falls...10 a.m., Dec.	9..	Five concrete bridges; six concrete culverts	S. O. Tjosvold, Co. Aud.	
O., Marletta	Dec.	9..	Ludlow Bridge	W. D. Alexander, Co. Aud.
S. D., Howard	2 p.m., Dec.	9..	Steel and concrete bridges for 1914.....	W. E. Leonard, Co. Aud.
N. J., Marlboro	11 a.m., Dec.	10..	Reinforced concrete bridge	J. M. Corlies, Dir. Bd. Freeh's.
O., Columbus	noon, Dec.	10..	Re-flooding bridge	J. Scott, Clk. County
Ariz., Wellton	10 a.m., Dec.	10..	Concrete bridge, 650 ft.....	L. Cobb, State Engr.
N. J., Long Branch.....	11 a.m., Dec.	10..	Concrete bridge and retaining walls	J. M. Corlies, Dir.
O., Mansfield	noon, Dec.	11..	Bridge in Monroe Township.....	J. A. Dalton, Co. Aud.
Okla., Oklahoma	10 a.m., Dec.	11..	Sixteen steel or concrete bridges.....	W. W. Storm, Co. Clk.
O., Cincinnati	noon, Dec.	12..	Bridge repairs	Bd. Co. Comrs.
Me., Orrs Island	Dec.	13..	Bridge	G. B. Merrill, Engr., Portland
Neb., Omaha	noon, Dec.	13..	Constructing and repairing bridges.....	F. Dewey, Clk.
Ind., Richmond.....	11 a.m., Dec.	13..	Approach to bridge	L. S. Bowman, Co. Aud.
S. D., Huron	2 p.m., Dec.	16..	Construction and repairing bridges, 1914	E. C. Ackerman, Co. Aud.
O., Bryan	2 p.m., Dec.	16..	Culverts and bridges	J. R. Marker, St. Hwy. Comr.
O., Washington C. H.....	2 p.m., Dec.	16..	Culverts and bridges	J. R. Marker, St. Hwy. Comr.
N. Y., White Plains...11 a.m., Dec.	22..	Two-leaf bascule lift bridge	H. G. Green, Clk. Bd. Supv.	
Mont., Great Falls.....	Dec.	22..	Pratt truss highway bridge, two span.....	U. S. Reclamation Serv.
S. D., Elk Point	noon, Dec.	23..	Steel, concrete and wood bridges.....	J. Holden, Co. Aud.
O., Hamilton	Jan.	1..	Concrete or steel bridge, 650-ft span	F. Hemmerl, Engr.
S. D., Desmet.....	1 p.m., Jan.	6..	Steel or reinforced concrete bridges.....	W. M. Look, Co. Aud.
S. D., Woonsocket	noon, Jan.	6..	Steel and concrete bridges for 1914.....	J. Kingsburg, Co. Aud.
S. D., Aberdeen	Jan.	6..	Six bridges	Co. Comrs.
S. D., Canton	Noon, Jan.	7..	Bridges and culverts during 1914.....	T. O. Torbison, Aud.
S. D., Clear Lake.....	2 p.m., Jan.	8..	Steel and concrete bridges.....	A. I. Larsen, Co. Aud.
S. D., Pierre	Jan.	14..	Steel bridges, 1914	C. E. Hanon, Ch. Bd. Co. Com.
MISCELLANEOUS				
O., Mt. Vernon	noon, Dec.	6..	Improving river bank	C. M. Williams, Dir.
N. J., Moore's Station...2.30 p.m., Dec.	6..	Furnishing and erecting, 30 by 13.....	J. Biddulph, Ch. Com.	
Ill., Chicago	noon, Dec.	8..	Auto chassis and ambulance body.....	G. B. Young, Comr.
Pa., Philadelphia	noon, Dec.	8..	Filling lakes	M. L. Cooke, Dir.
Tex., Dallas	noon, Dec.	8..	Furnishing typewriters	Chas. E. Gross, Co. Aud.
Fla., Pensacola	2 p.m., Dec.	8..	Inclinerating plant 15 tons capacity	A. Greenhut, Mayor.
Mass., Boston	noon, Dec.	9..	Underground station	B. L. Beal, Sec.
Tenn., Gainesboro	Dec.	10..	Jail and residence	M. J. Dixon, Ch. Com.
N. Y., Rosebank	Dec.	10..	Concrete retaining wall.....	J. J. O'Connell, Health Officer
Ga., Augusta	4.30 p.m., Dec.	16..	Fire house	L. C. Hayne, Mayor
Ill., Chicago	11 a.m., Dec.	16..	Substructure for pier	E. C. Shankland, Ch. Comm.
Tex., Abilene	noon, Dec.	18..	Fireproof court house	E. M. Overshiner, Co. Judge.
D. C., Washington	3 p.m., Dec.	19..	Construction of Post Office at Du Quoin, Ill.....	O. Wenderoth, Superv. Arch.
D. C., Washington	3 p.m., Dec.	20..	Extension & remodeling customhouse at St. Louis, Mo.....	O. Wenderoth, Supv. Arch.
Minn., Carlton	10 a.m., Dec.	22..	Two-story jail and sheriff's residence.....	R. Norman, Co. Aud.
Cal., Richmond	Dec.	29..	Harbor work	City Clerk.
Ill., Chicago	noon, Jan.	5..	Rapid transit subways	E. Block, Ch. Trans. Com.

STREETS AND ROADS

Florence, Ala.—The Florence County Board of Road Commissioners have decided to complete Florence-Darlington highway, running alongside Atlantic Coast Line tracks from this city. Road is being widened to 40 ft. and is being nicely graded. All waterways are being made of concrete, as is also what is known as High Hill Creek, near Palmetto, which is dividing line between Florence and Darlington Counties. One-half of cost of construction and up-keep of this work will be paid for by Florence County and other half by Darlington County. This will give to Florence and Darlington a 10-mile highway of very best sand clay road.

Fort Smith, Ark.—Commissioner Hays is still working on plan for improvement of South Sixth St. and making of it one of finest in city. His plan is to improve street from Garrison Ave. to Garland Ave. Block between Garrison and Rogers Aves. is to be paved with creosoted blocks and remainder of distance is to have macadam scarified and then be given surface of sheet asphalt.

Van Buren, Ark.—County Commissioners are considering construction of 30 miles of macadam roads.

Auburn, Cal.—Citizens of Michigan Bluff are actively agitating new road from Forest Hill to Michigan Bluff. Present road from Baker Ranch to Michigan Bluff is steep, averaging 26 per cent. grade. Proposed new road will have grade of 7 per cent. and will cross Volcano Canyon 140 ft. above old crossing. It is estimated that new road will cost \$3,000.

Berkeley, Cal.—Following street improvements have been recommended: To pave Grove St., from Allston way to south city line; pave Adeline St., from Ward St. to south city line; pave Dwight Way from Grove St. to Piedmont Ave.; pave Bancroft Way from Barrow St. to College Ave. and from Shattuck Ave. to Grove St.; pave Ashby Ave. from Telegraph to College Ave.; pave University Ave. from 100 ft. west of Grove St. to Third St.; pave Addison St. from Shattuck Ave. to Grove St.; pave Center St. from Milvia St. to Grove St.; pave Allston Way from Dana St. to Fulton St.; sidewalks, full width, on Center St., from Shattuck Ave. to Grove St.; sidewalks, full width, on Allston Way from Shattuck Ave. to Grove St.

Pasadena, Cal.—Bids will shortly be opened for paving of North Lake Avenue, from Colorado to Washington St.

Pasadena, Cal.—Resolution has been adopted for improvement of St. John Avenue and Carter Alley. John Beyer is Supt. Streets.

Richmond, Cal.—The action of the Board of Supervisors in purchasing \$300,000 worth of state highway bonds insures new boulevard to Richmond and county. The new highway, which will be 16 ft. in width, with concrete foundation and asphalt top, will follow shore edge as closely as possible.

Sacramento, Cal.—By special resolution Advisory Board has authorized the sale at public auction on December 22 of \$1,800,000 in State highway bonds.

Sacramento, Cal.—Bids for seven portions of new state highway, aggregating about \$270,000, have been opened in Highway Commission's rooms. For 8-mile stretch between Fowler and Kingsburg in Fresno County, engineers' estimate \$43,858.24, A. Teichert & Son of Sacramento bid \$39,695.60. For 8-mile stretch between Fresno and Fowler in Fresno County, estimate \$38,543.70, A. B. Munson & Son, of Stockton, bid \$42,597.50, and A. Teichert & Son, of Sacramento, \$36,551.

San Francisco, Cal.—Plans are being made for improvement of unpaved streets.

San Francisco, Cal.—County has voted \$50,000 bond issue for improvement of Lincoln Highway.

San Francisco, Cal.—Construction of new roadway down peninsula out of San Francisco to meet State highway at San Bruno is project upon which considerable preliminary work has been done.

St. Augustine, Fla.—Bond issue has been carried for street improvements.

St. Petersburg, Fla.—Board of Commissioners has ordered five more blocks of street paving.

Tampa, Fla.—Board of County Commissioners will advertise for bids for laying of some 20 miles of brick highways in county. Commissioners have decided that competitive contracts will be cheapest and most satisfactory method of getting roads built. With \$500,000 in hand road building work will

be pushed. It is intention of commissioners to spend entire issue of \$1,000,000 within a year, if it is possible to put roads down that rapidly, so as to save as much as possible of ruinous cost of repairing old rock and shell roads, on which approximately \$100,000 is being spent in upkeep each year.

Brazil, Ind.—City Engineer Frank Kattman will prepare plans for paving various streets with vitrified brick with sand filler.

Indianapolis, Ind.—Survey has been completed by Bd. of Park Comrs. for proposed military road or boulevard to Ft. Harrison.

Richmond, Ind.—Board of Commissioners and County Treasurer of Wayne County will receive bids for gravel road bonds until noon, Dec. 6, for improvement of highway in Wayne Township. A. N. Chambers is County Treasurer.

South Bend, Ind.—Resolution has been passed appropriating North St. Louis St. from South Bend Ave. to Corby St., Riverside Drive from Marion St. to Angela Ave. and Lafayette St. from Riverside Drive to Monroe St. for boulevarding purposes.

Wayne, Ind.—Notice is given that on December 6, 1913, until 12 o'clock, noon, Board of Commissioners and County Treasurer of Wayne County, Indiana, will receive sealed bids for gravel road bonds issued by said board for improvement of highway in Wayne Township, Wayne County, Indiana. A. N. Chamness is Co. Treasurer.

Le Mars, Ia.—County Commissioners will spend \$135,000 on road and bridge work during coming year.

Hutchinson, Kan.—Big petition is being circulated and generally signed in Alta and Burrton Township, asking Harvey County Commissioners to appropriate \$3,000 for claying sand hill road north of Burrton. Improvement would be on road on first section line east of Burrton. Four miles of this road needs claying, extending to Little River, where county has just built concrete bridge, 50-ft. span costing \$3,598.

Hutchinson, Kan.—Aves. A, B and E West, from Main to Washington, are to be paved in spring.

Baton Rouge, La.—Ch. Engr. Atkinson of Highway Dept. of State Bd. of Engrs. is here making inspection of route from Baton Rouge, to Hope Villa, over Clay-Gut Rd., which is to be built into model road by state, parish and good roads district embracing territory along the road. Mr. Atkinson has recommended use of gravel as surface for road for reason that it is easier of access than Birmingham slag or any other material, and because it can be put down cheaper. Bids will at once be advertised for construction of road, as fund, \$52,000 for road work is at hand.

Thibodaux, La.—Plans are being made for construction of four to five miles of street paving. Bids will shortly be advertised.

Biddeford, Me.—A macadam road from city proper down Pool Rd. to Leightons Point at head of long sandy isthmus that connects mainland with rocky peninsula known as Biddeford Pool is being discussed.

Portland, Me.—The Portland-Bath highway is assured. At meeting of Governor and Council, State Treas. Simpson was authorized and instructed to set aside from proceeds of current issue of state highway bonds sum of \$30,000 to be used in connection with government appropriation for purpose of constructing highway from Portland to Bath. This \$30,000 added to \$80,000 set aside by Governor and Council, Nov. 4, 1913, and total, or \$110,000, together with sum of \$20,000 appropriated by Legislature and accepted for this work by order of Governor and Council, Oct. 4, makes \$130,000 raised by state to be expended upon highway.

Baltimore, Md.—City Councilman Spencer, of 4th Ward, will ask Paving Comm. that new paving for Baltimore St. be continued to Fremont Ave.

Swampscott, Mass.—Plans are being made for widening of Humphrey St.

Duluth, Minn.—Plans are being considered for various street improvements.

Aberdeen, Miss.—Bids are being received by G. G. Ray, Clk. Co. Bd. Superv., for \$125,000 bonds of Superv. Dist. No. 4.

St. Joseph, Mo.—Ordinances have been adopted for grading of various streets. F. W. Lauder is Clerk.

St. Joseph, Mo.—Grading of 31st St. is being considered. F. W. Lauder is Clerk.

St. Joseph, Mo.—Isadore St. is to be paved from Third to Fourth Sts. with concrete.

St. Joseph, Mo.—Ordinances have been adopted for grading of various streets.

St. Joseph, Mo.—By change of 3 ft. in grade of "A" boulevard, Park Bd. could save property owners \$15,000 in grading bill. Bids under present plan for grading aggregate about \$25,000 for entire work. Under new plan cost would be \$9,100. J. H. Barnes, Engr. for Bd., has figured plan for reducing grade 3 ft. at 31st and Patee and 30th and Patee Sts.

Asbury Park, N. J.—Bonds in sum of \$121,000 will be sold for paving of Knigsley St.

Camden, N. J.—Ordinances have been adopted for paving and repaving of various streets.

Elizabeth, N. J.—Repaving of Elizabeth Ave. and Broad St. is being discussed.

Elizabeth, N. J.—Ordinance has been adopted for paving of Magnolia Ave. from Third St. to Fifth St. with brick on concrete foundation.

Passaic, N. J.—Plans are being made for road improvement work next spring. Permanent pavement will be laid on Paterson and Hamburg turnpikes.

Plainfield, N. J.—Improvement of Sherman Ave. is being discussed.

Trenton, N. J.—Ordinance has been introduced providing bond issue of \$24,000 to cover cost of paving Parkside Ave. and repaving West State St.

Ventnor, N. J.—Bonds in sum of \$25,000 for permanent street improvements are being considered.

Alden, N. Y.—Board of Trustees of Village of Alden, N. Y., will receive sealed proposals until 8 o'clock P. M., December 8, 1913, for purchase of the whole or any part of \$6,000 bonds of said village, authorized for the construction of brick pavement in said village. W. C. Martin is Village Clerk.

Dexter, N. Y.—Taxpayers have voted in favor of brick pavement in village.

Newfane, N. Y.—The following roads are to be improved: The Ewings Rd. from Tpke., north; East Main St. of Olcott as far as park; Hess Rd. west toward village of Newfane; and Henderson Rd. from Coomer Rd. to McClaw Rd.

Niagara Falls, N. Y.—Mayor Laughlin plans to have Buffalo Ave. from Hydraulic Canal to 24th St. converted into boulevard. Plans call for two roadways instead of present single one. Street is 99 ft. wide and Mr. Barton suggested that an 18-ft. roadway be constructed on each side of car tracks. The improvements will cost \$78,440.60.

Oneida, N. Y.—Council has four petitions from property owners in Sands, Grove, Park Ave. and Cedar Sts. asking for improvement of those thoroughfares.

Saratoga Springs, N. Y.—Resolution has been adopted for construction or improvement of highway between Malta, on county road No. 610, running thence southerly to depot of Delaware & Hudson R. R., at Round Lake, having total length of 1½ miles in town of Malta.

Warrenton, N. C.—Warrenton Township has held election on proposition to issue \$50,000 worth of bonds for improvement of roads and result was vote of 9 to 1 in favor of bonds.

Akron, O.—Completion of unpaved stretch of Akron-Hudson-Cleveland highway is being considered.

Columbus, O.—Ordinance providing for repaving and improvement of High St., from Livingston Ave. to Union Station, with either asphalt or creosoted wood block, has been introduced in Council.

Dayton, O.—Ordinances have been adopted for improvement of various streets.

Toledo, O.—City Solicitor Schreiber has been instructed to prepare necessary legislation looking to advertising and sale of \$98,000 worth of East Broadway grade separation bonds.

Urbana, O.—Ordinances for paving Main St. from south corporation line to Washington Ave., Miami St. from Square to Pennsylvania R. R. and Scioto St. from Square to Willows, given second reading.

Urbana, O.—Ordinances for paving of South Main St., from square to south corporation line; Scioto St., from the square to Patrick Ave.; North Main St., from the square to Washington Ave., and Miami St., from the square to the Pennsylvania Railroad, have been given their first reading. Legislation provides for use of brick, asphalt blocks, creosoted wood block and sheet asphalt. Total cost of paving with materials mentioned, according to plans and specifications prepared by City Engineer Sweetman, are as follows: Brick, \$136,410; sheet asphalt, \$142,460; asphalt block, \$154,590; creosoted wood blocks, \$198,258. The total cost to the property holders will be: Brick \$104,995; sheet

asphalt \$110,775; asphalt block, \$118,520; creosoted wood block, \$151,898. The number of square yards included in the specifications is: Brick, 64,000; asphalt and wood block, 60,650. Difference in number of square yards for different materials is on account of curb line.

Youngstown, O.—Various street improvement bonds have been divided between Sidney, Spitzer & Co. of Toledo and Hayden, Miller & Co.

Harrisburg, Pa.—Select Council has passed following ordinances: To pave Carrie Alley, from Cameron St. to 10th St.; authorizing the grading of 21st St., from Knox St. to Derry St.; paving Turner Alley, from a point 117½ ft. south of Forrest St. to Forrest St.; paving and curbing of Turner Alley, from MacLay St. to a point 117½ ft. south of Forrest St.; opening and grading of Whitehall St., from the western side of Prospect St. to Market St.

Philadelphia, Pa.—Repairing of Chestnut St. with wood block is being discussed.

Waynesboro, Pa.—Paving of portion of East Main St. is being planned.

Charleston, S. C.—Petition for paving of Gibbes St. from Legare St. to end of roadway, with asphalt concrete and paving of north sidewalks with cement has been referred to committee on streets.

Charleston, S. C.—Resolution of Alderman Wohltmann that Meeting St., between Wentworth and Society, be paved with creosoted wood block under abutting property owners' law at total cost of \$3,961.73, and that city's amount be appropriated from city treasury, has been adopted.

Knoxville, Tenn.—Following pikes are to be resurfaced. The surface "treatment" is of California asphalt. The Sevierville pike will be covered a distance of about 6,500 ft. from the end of the Tennessee River bridge to Highland Drive. The Island Home pike will be surfaced for a distance of 4,000 ft. from the Sevierville junction to Island Home. The Martin Mill pike will be "treated" for a distance of about one-half mile, from the river bridge to a point near the South Knoxville Macadam Co.'s plant.

Lewisburg, Tenn.—Lewisburg is shortly to have boulevard leading from square to new passenger depot on Lewisburg & Northern R. R. Several macadamized cross streets are also contemplated. It is announced that work on new station, which is to cost about \$20,000, will be begun at early date.

Nashville, Tenn.—Improvement of West End Ave. is under consideration.

Brackettville, Tex.—Citizens of Kinney County have voted \$80,000 bond issue for constructing roads.

Dallas, Tex.—Petitions are now in course of circulation among taxpaying voters of Dallas County to ask County Commissioners' Court to order another special election for voting of bonds for paving of Dallas-Oak Cliff viaduct with some permanent and durable paving material, such as creosoted wood blocks or bitulithic.

Fort Worth, Tex.—The Arlington and Randle Mill Road, in Precinct Nos. 1 and 2, has been ordered improved for distance of one mile at a cost of \$1,000.

Greenville, Tex.—The County Commissioners of Hunt County have been requested to call election within 30 days for purpose of voting bonds for constructing more macadamized roads throughout county. Election will probably be called for last of December.

Houston, Tex.—City Engineer will prepare plans and specifications for paving of Preston Ave.

McKinney, Tex.—Widening of Bridge St. is contemplated.

McKinney, Tex.—Bond issue has been voted for various street improvements.

Streetman, Tex.—Commissioners' Court of Freestone County has ordered good roads bond election in road precinct No. 2. Election will be held December 16, and amount to be voted on is \$50,000. District includes Streetman and Kirvin.

Wentherford, Tex.—The Commissioners' Court of this county has made appropriation of \$1,500 to grade, gravel and complete culverts on 3¼ mile cut-off of the air line road to Fort Worth.

Norfolk, Va.—Paving of streets in Rievreview Section of Seventh Ward and two blocks on 38th St. is under consideration.

Spokane, Wash.—Department of Public Works has been requested by City Commissioners to submit plans and specifications for grade separation project at Trent Ave. and Sheridan St.

Racine, Wis.—Resolutions have been adopted for improvement of various streets.

CONTRACTS AWARDED.

Gadsden, Ala.—For paving with asphalt on concrete base Forest Ave. by City Council to Goodrich & Crinkley, of Anniston, Ala.

Tucson, Ariz.—Contract for paving of Congress St. has been awarded to Arizona Asphalt Paving Co. at contract price of \$62,440.64.

Corona, Cal.—For paving with macadam Olive, Palm and Belle Aves. to O. F. Easley of Corona at \$27,383.

Inglewood, Cal.—To the S. C. Contracting Co., Venice, Cal., at \$13,277, for improvement of Spruce Ave., from Manchester to Grevillea St., including 2,844 lin. ft. macadam, 5,669 lin. ft. curb, 8,311 sq. ft. gutter, 134 sq. ft. vitrified gutter, 28,623 sq. ft. walks and 4 concrete culverts.

Los Angeles, Cal.—To Fred Hoffman, Long Beach, Cal., at \$19,000, on improving certain roads in Road Improvement District No. 20, between Artesia and Clearwater, by County Commission.

Oakland, Cal.—For improvement of Wilson Ave., to Ransome-Crummey Co., at following prices: Per sq. ft. of earth grading, 2 cts.; per sq. ft. of earth regrading, 2 cts.; per lin. ft. of redwood curb, 12 cts.; per sq. ft. of concrete gutter, 14 cts.; per sq. ft. of oil-macadam, 10½ cts.; per sq. ft. of cement sidewalk, 12 cts.; per sq. ft. of 12-in. conduit, 60 cts.; per storm water inlet, \$30.

Sacramento, Cal.—Highway bids have been awarded as follows: Between Upland and Citrus Aves., San Bernardino Co., to the Hudson-Johnson Co., Los Angeles, \$48,928; from Rincon Creek to Carpinteria Creek in Santa Barbara Co., to the Occidental Const. Co., Los Angeles \$13,705; from Fowler to Fresno and Fowler to Kingsburg, both in Fresno Co., to A. Teichert & Sons, Sacramento, \$36,551 and \$39,795, respectively.

Sacramento, Cal.—For improvement of 24th St. to Clark & Henery Const. Co.

Sacramento, Cal.—Awards to contractors for construction of four sections of state highway have been made as follows: Between Upland and Citrus Aves., San Bernardino County, to the Hudson-Johnson Co., Los Angeles, \$48,928; from Rincon Creek to Carpinteria Creek, in Santa Barbara County, to the Occidental Construction Co., Los Angeles, \$13,705; from Fowler to Fresno and Fowler to Kingsburg, both in Fresno County, to A. Teichert & Sons, Sacramento, \$36,551 and \$39,795, respectively.

Bridgeport, Conn.—Contract for 21,743 lin. ft. of graded roadway in town of Stratford has been awarded to Bennett N. Beard Co., of Shelton, for \$22,838. This road is connecting link on river road between Stratford and Shelton, and the principal thoroughfare from Bridgeport to the Berkshires.

Hartford, Conn.—To Frank Arrigoni & Bro., Middletown, at \$9,424, for section of native stone macadam road in town of Brooklyn, by State Highway Commission.

St. Andrew, Fla.—By Town Council of town of St. Andrew contract for building three or more miles of shell streets to J. M. Willis. Streets will be graded to 30 ft. with 6 ft. sidewalks on both sides. Crown of shells 16 ft. will be pressed down in center.

St. Petersburg, Fla.—For construction of 7 miles of 6 ft. wide sidewalk to H. A. Farmer of St. Petersburg at \$20,000.

Pocatello, Ida.—For paving with bitulithic with stone base all cross streets between Main and S. Arthur St. and from Center St. to subway to Strange & McGuire Paving Co., of Salt Lake City, Utah, at \$12,000.

Alton, Ill.—For construction of vitrified brick pavement and improvement of Bellevue Ave. and Summit St. to C. H. Degenhardt.

Springfield, Ill.—For construction of brick pavement in Rutledge St., from Calhoun Ave. to North Grand Ave. to R. F. Egan at \$1.72 per sq. yd. for pavement and 5 cts. per lin. ft. for sandstone curb. F. H. Hamilton, Pres. Bd. of Local Improvements.

Crown Point, Ind.—By County Commissioners the following contracts for six gravel roads in Lake County: Ajax Construction Co., at \$7,400 for W. L. Cole Road; Nedji & Greenwald, \$55,000, for opening and improving G. W. Jones Road; same company \$3,500, for A. M.

Maretz Road; Downey & Portz, \$9,000, for C. J. Williams Road; Ahlborn Construction Co., Hammond, \$14,200, for Kenwood Ave. Road; same company at \$17,490 for Peter Sengiz Road.

Richmond, Ind.—Work on first concrete roads in Wayne County will begin at once, contracts having been signed for Haas and Barton roads. W. H. Boyd, of Dayton, will build Barton concrete and brick road for \$45,499.20, and F. E. Slick, of this city, was awarded contract for Haas road at \$41,949.13.

Donaldsonville, La.—Contract for construction of from 22 to 23 miles of gravel roads from Iberville line to about three miles below Donaldsonville, and from this city to Assumption line, has been awarded by Police Jury to L. P. Sawyer, of Alexandria, at \$2,795 per mile. Contractor agrees to accept in payment bonds to be issued by road district at their par value. M. H. Richardson, of State Board of Engineers, has been engaged by Police Jury to supervise construction of roads on behalf of parish.

Baltimore, Md.—To McDonald Construction Co., Mt. Vernon, N. Y., at \$37,261, for grading 5.53 miles and resurfacing same with gravel in town of Bath, for State Highway Commission.

Boston, Mass.—For paving with macadam Cottage and Lubec Sts. by Mayor and Bd. Pub. Wks. to Jas. Doherty, of Boston, at \$7,932.

Kansas City, Mo.—For grading 115,000 cu. yds. of earth and rock from west side of Main St., between 24th and 27th Sts., to Spitscaufsky Bros., at 96½ cts. per cu. yd. Lowest bid opened by County Comrs. for macadamizing 44,800 yds. on Oak Grove and Sni Mells Rd. has been submitted by Albert Hood, of Independence, at \$21,000.

Hamilton, Mont.—To Geo. Keith, Missoula, Mont., at \$11,950, for construction of 40,000 ft. of Bitter Root-Big Hole wagon road, by Ravalli County Commissioners.

Miles City, Mont.—To Two Miracle Concrete Co., at \$22,949 for construction of sidewalks on various streets, in Miles City.

New Bedford, Mass.—Co. Comrs. have opened bids for granite curbing and steps for new third district court house on Spring and Pleasant Sts. There were four bids, and contract was awarded to Flavian Cote of Fall River, lowest bidder, for \$1,545. Other three bids were as follows: John B. Sullivan & Son, \$1,677; Saviole Quarry & Const. Co., \$2,274; New Bedford & Dartmouth Granite Co., \$2,420.

Elizabeth, N. J.—By City Council contract to Samuel Sampson, Elizabeth, at \$9,708, for paving Princeton Road, El Mora, N. J.

Jersey City, N. J.—By Board of Commissioners, to Ralph Sangiovanni, contract for repaving of Jersey Ave., from Newark Ave. to 8th St. Contract price is 93 per cent. of standard. William Van Keuren will do repaving of Erie St., from 3d to 4th St.

Albany, N. Y.—By Board of Contract and Supply contract to Kenny & Dumary for improvement of Kent St., from Ontario to Partridge Sts., at \$13,858; also for improving Grove Ave., from New Scotland to Helderberg Aves., at \$14,647.

Brooklyn, N. Y.—For construction of New Utrecht Ave. line, by Public Service Commission, to Post & McCord, Inc.

Lockport, N. Y.—For construction of new concrete sidewalk on West & Richmond Aves. to H. E. Whitney, at \$701.90.

Dresden, O.—By Council for paving Main St. to George H. Heffner & Son, of Celina. Distance to be paved is a mile, less 500 ft. Specifications call for concrete base and for Townsend paving blocks. Bids were submitted two months ago. Seven firms contested. Paving will cost about \$30,000.

Medford, Ore.—To Kessel & McDowell Logging Co., of Tacoma, Wash., contract for grading Pacific Highway 13 miles over Siskiyou Mountains by State Highway Engr. Bowlby and the Co. Court, price being \$107,534.30. They were lowest of nine firms that bid.

Altoona, Pa.—At meeting of Board of Public Works contract for paving nine different sections of streets and alleys in Ninth Ward has been awarded to Bell-Bockel Co.

Spartanburg, S. C.—To Noll Construction Co., Chattanooga, Tenn., at \$145 per sq. yd., for constructing 90,000 sq. yds. of street paving; 4-in. concrete base, 2-in. asphalt top. John F. Floyd is Mayor.

Greenville, Tenn.—To Mann Construction Co., Knoxville, at \$200,000, for macadamizing roads in Green County.

Ogden, Utah.—City Board of Commissioners has accepted bid of George A. Whitmeyer & Sons for the construction of curb and gutter district No. 110 and contract has been awarded. Cost of improvement will be \$2,693.26.

SEWERAGE

Clayton, Ala.—Election will shortly be held to vote on issuing bonds for construction of sewer system.

Alhambra, Cal.—Voters will shortly express their opinions about bonding city in order to install sewers and buy municipal water system. It is proposed to expend \$300,000 or more on sewer system and Alhambra's share of "out-fall sewer."

Grass Valley, Cal.—Taxpayers will vote on \$5,000 bond issue for extension of sewer system.

Lodi, Cal.—It has been decided to lay 1,350 ft. of 8-in. sewer from Citrus Fruit Products plant to Lodi Ave. and 300 ft. in Ayers & Pritchard addition. It is estimated that cost of this work will approximate \$820.

Sacramento, Cal.—City Comm. is planning to put on sale at once \$1,032,000 of sewer bonds recently voted.

Richmond, Cal.—Plans and specifications for proposed sewer system to serve the annexed district of city have been completed by City Engr. H. D. Chapman and have been submitted to City Atty. D. J. Hall to be checked over, before being filed with City Council at its meeting. Construction of adequate sewer system for annexed section of city will be one of largest single street improvement jobs ever undertaken by municipality. Proposed system will serve Stege, Pullman and East Richmond, as well as portion of El Cerrito, and has long been advocated by citizens of annexed section.

St. Augustine, Fla.—Bond issue has been called for sewerage.

Boise, Ida.—Plans will be completed shortly for sewers in South Boise. C. C. Stevenson is City Engr.

Brazil, Ind.—Establishment of sewerage disposal plant at extremity of big sewer is being considered.

Montezuma, Ia.—City Council is said to have decided to construct about 13,000 ft. of sewer to cost about \$7,000.

Pittsfield, Mass.—Board of Public Works will ask City Council for \$2,000 for new West St. drain.

St. Paul, Minn.—Sewer system will be enlarged this winter. Estimated cost of the initial extension is about \$30,000. J. E. Fearing is City Engineer.

St. Joseph, Mo.—Ordinance has been passed to provide for construction of sewers in portion of Sewer District No. 144, being along South Sixth St., King Hill Ave., Springwood St. and the alley first east of King Hill Ave. F. W. Launder is Clerk.

Jersey City, N. J.—Bonds have been sold for construction of Mill Creek sewer.

Atlanta, Ga.—Following are itemized bids for Intrinchement Creek interceptor. Contract was awarded to M. F. Sullivan at \$55,381. (A) Dysard Construction Co.; (B) M. F. Sullivan; (C) Nichols Contracting Co.:

	(A)	(B)	(C)
3,000 cu. yds. earth exc. & backfilling, 10 ft. or under.....	\$0.60	\$0.63	\$1.00
13,000 cu. yds. earth exc. & backfilling, 15 ft. or under.....	.80	.63	1.50
4,000 cu. yds. earth exc. & backfilling, 20 ft. or under.....	1.25	.63	2.00
100 cu. yds. earth exc. & backfilling, 25 ft. or under.....	1.50	.63	3.00
3,000 cu. yds. rock excavation.....	2.50	2.55	4.00
800 ft. concrete sewer, Type A, in place, 48".....	5.50	4.17	4.75
6,700 ft. concrete sewer, Type B, in place, 48".....	6.00	4.27	5.15
7,500 ft. reinforced concrete sewer, in place, 48".....	4.60	5.40	5.90
7,500 ft. seg. block vitrified clay sewer, in place, 48".....	4.00	4.00	5.90
10,000 brick.....	20.00	20.00	20.00
100 cu. yds. concrete.....	6.50	10.00	10.00
2 manhole castings, Type A.....	9.00	10.00	15.00
12 manhole castings, Type B.....	9.00	8.00	15.00
150 manhole steps.....	.20	.35	.35
100 sq. ft. cut flagging, in place.....	1.00	1.50	2.00
50 cu. ft. cut stone.....	1.80	2.00	2.50
150 cu. yds. rubble masonry.....	3.00	6.00	6.50
10,000 lumber B. M.....	22.00	30.00	40.00
1,000 cu. yds. crushed stone for foundation, in place.....	2.50	2.15	2.75
2,000 lbs. reinforcing steel, in place.....	.05	.05	.05
Total.....	\$29,316.00	\$25,381.50	\$48,812.50
Total.....	\$73,916.00	\$57,326.50	\$87,117.50
Total.....	\$63,816.00	\$65,881.50	\$93,062.50
Total.....	\$59,316.00	\$55,381.50	\$93,062.50

Goshen, N. Y.—Now that taxpayers have voted for sewers, arrangements will be rushed ahead, and it is expected that work will be started by early spring. Rights of way will have to be secured and minor details perfected before plans can be submitted for bids.

Middletown, N. Y.—George A. Johnson of New York City has stated that a sewage disposal plant adequate for needs of city could be constructed for from \$75,000 to \$80,000.

Syracuse, N. Y.—Ordinance declaring intention to order a 12-in. sewer in Hill-side St. has been adopted.

Utica, N. Y.—A resolution directing the City Engineer to make plans and specifications for sewerage system for York Heights, Yale-Pleasant Heights and Mather Manor, and submit it with estimates of cost to Board of Contract, has been referred to sewer committee.

Spencer, N. C.—Board of Aldermen has held special meeting to pass upon agreement with Southern Railway for construction of new sewer outfall from Salisbury Ave. to creek. It will be 2,000 ft. long and 18 ins. in diameter and when completed will serve new territory not heretofore provided with sewer.

Mount Vernon, O.—Ordinance has been passed providing for bond issue of \$16,000 for construction of sewage treatment plant. A. A. Perrine is Mayor and J. H. Wootton is Clerk.

Urbana, O.—On motion of McCracken, City Engr. Sweetman will be instructed to prepare necessary plans and specifications for storm sewers on streets where paving is completed.

Urbana, O.—Ordinance for issuance of bond to amount of \$48,000 has been given its first reading and referred to Finance Com. Money derived from sale of said bonds is for construction of sewage disposal plant, plans and specifications for which have already been accepted by Council as approved by State Bd. of Health.

Eugene, Ore.—Petition for sewer on Jefferson St., from 15th to 19th, has been referred to committee.

Lansdale, Pa.—Council is said to have passed ordinance providing for issue of \$80,000 bonds for sewer system to be submitted to vote.

Riverpoint, R. I.—A meeting of committee appointed at West Warwick financial town meeting to prepare plans and devise means for sewerage system in Pawtucket Valley villages will be held at Town Hall at Riverpoint for purpose of organization.

Greenville, Tenn.—People will vote on proposition to bond town in sum of \$40,000 for sewer purposes.

Temple, Tex.—The Attorney General has approved issue of \$75,000 of Temple sewer purchase and extension bonds, voted some months ago and recently sold to N. M. Halsey & Co., of Chicago. Proceeds will be collected and property of the Temple Sanitary Sewer Co. will be acquired by city and about \$30,000 spent in making improvements and extensions of same, it being purpose to practically cover every portion of city now unserved with mains and compel connection of premises therewith.

Victoria, B. C.—Repairs will probably be made to Oxford sewer, to be of brick; cost about \$30,000.

CONTRACTS AWARDED.

Oakland, Cal.—For construction of sewer, to E. H. Sundberg, at following prices: Furnishing and laying 8-in. pipe, at 74 cts. per lin. ft.; furnishing and laying 8-in. "Y" branches, at 50 cts. each extra; constructing brick manholes, with covers, complete, \$45.00 each; constructing lampholes, with covers, complete, \$9 each. F. M. Smith is City Clerk.

Middletown, Conn.—Com. on Sewers have opened bids for construction of sewer 1,100 ft. long and 10 in. diameter vitrified salt glazed pipe, in North Main St. Five bids were received, as follows: John S. Cantwell, Middletown, \$1,325.28; Angelo Conti, Hartford, \$1,888.85; A. Brazos & Sons, Middletown, \$1,485; Antonio Lambro, Waterbury, \$1,445; Salvatore Mazzotta, Middletown, \$1,325. Com. has voted to award contract to lowest bidder, Mr. Mazzotta.

Jacksonville, Fla.—Contracts that will total some \$10,000 in all have been authorized at meeting of committee on public works of Board of Bond Trustees following recommendations reported by Chief Engineer L. D. Smoot and Superintendent of the Water Works Department E. L. Carroll, those contracts referring to sewer pipe and supplies considered by committee a week ago. Sewer pipe in sizes from five to twelve inches in diameter, including Y's, was awarded to Georgia Vitrified Block & Clay Co. Contracts for cement were awarded to Carolina Portland Cement Co. Columbia Iron Works secured contract for catch basin castings. Florida Machine Works were awarded castings for manholes. Contract for brick went to Marshall & Spencer Co.

Dixon, Ill.—To Chas. E. Hughes, Rockford, Ill., at \$12,569, for construction of from 6 to 30-in. sewers, by Council. C. F. Nesbit is Engineer.

Galesburg, Ill.—To Geo. E. Mallory, Kewanee, Ill., contract at \$5,723.93, for 320 ft. 15-in. and 144 ft. 10-in. pipe sewer in Simmons St.

Springfield, Ill.—For construction of 18-in. sewer in Fourteenth St. from Ash St. to Cornell Ave. to John W. Ryan, at 64½ cts. per lin. ft. for sewer, 33 cts. per lin. ft. for inlets and \$25 for each manhole. F. H. Hamilton, Pres. Bd. of Loc. Impts.

Ames, Ia.—By Council, for construction of storm sewer, south of tracks, to Aiken & Flutter, at \$5,528.

Baltimore, Md.—By Bd. of Awards, to Gallagher, Boyle & O'Brien, contract for building lateral sewers in large section of West Baltimore. They are to cover territory bounded on east by Schroeder St., on west by Fulton Ave., on north by Lanvale St. and on the south by Fayette St. Contract is worth \$176,154.

Fairmont, Minn.—For constructing sewers, to J. W. Turner Improv. Co., of Des Moines, at \$7,945. Other bidders: Wm. Danforth, St. Paul, \$8,587; Lars Overn, St. Peter, \$8,606; John P. Green, Albert Lea, \$9,850; Illstrup & Olsen, Albert Lea, \$9,766, and W. D. Lovell, Minneapolis, \$8,547. H. B. Tuttle is City Clk.

Joplin, Mo.—To V. S. Koch, 612 Wall St., contract for 300 ft. storm sewer in Virginia Ave.

Newark, N. J.—By Passaic Valley Sewerage Commission, contract for construction of outfall pipes of trunk sewer, to John C. Tierney, of Oradell, at price of \$437,500. He was lowest of five bidders. Outfall pipes extend about 1,500 ft. from Robbins Reef to points of disposal of sewerage.

Syracuse, N. Y.—Alexander Barr was lowest bidder on two sewer contracts for which proposals were received by Board of Contract and Supply. For sewer in Craddock St. his proposal was \$1,102.40 and for sewer in Sunset Ave. it was \$665.15. Samuel Bonn was lowest bidder, at \$611, for sewer in Lodi St., between Butternut and Ash Sts.

Bucyrus, O.—By Comrs. of Crawford Co., contracts for county ditch improvement No. 613, in Holmes Twp., as follows: 10,000 ft. tile, Kuenzli Bros., Nevada, O.; construction, Sec. 1 and 2, Joseph Gabriel, Bucyrus; Sec. 3 and 4, Wm. T. Marshall, Lemert, O. G. F. Ackerman is Co. Aud.

Reading, Pa.—Peter L. Scholl, city, at \$25,000, for erection of sewage disposal plant. Albright & Mebus, Land Title Building, Philadelphia, are engineers.

Seattle, Wash.—To Colosurdo & Co., at \$10,767, for construction of W. Seattle St. sewers.

New London, Wis.—By Common Council, contract for installation of sewer in Nassau St., to M. Nesbitt.

Racine, Wis.—For construction of sewer in Carlisle Ave., to Hans C. Hanson, at \$1.39 for 15-in. pipe, \$1.24 for 12-in. pipe, 98 cts. for 10-in. pipe, \$40 for manholes and \$40 for catchbasins.

WATER SUPPLY

Clanton, Ala.—People will vote on bond issue of \$25,000 for construction of waterworks system.

Alhambra, Cal.—Alhambra voters are getting ready to express their opinions about bonding city in order to buy municipal water system and to install sewers. It is proposed to submit proposition that people buy out the San Gabriel Valley Water Co. for \$450,000.

St. Augustine, Fla.—Bond issue has been carried for water works.

Winchester, Ill.—Citizens have voted to issue bonds for construction of municipal water works.

Goodland, Ind.—Election for water works has been carried by large majority.

Des Moines, Ia.—Water bonds in sum of \$238,000 will be sold shortly.

Osceola, Ia.—Election will be held on Dec. 9 for voting on \$10,000 bond issue for waterworks improvements.

Blair, Neb.—On Nov. 28 citizens will vote on \$20,000 for improvements of water plant and for extension of water mains.

Lestershire, N. Y.—Citizens have voted \$15,000 bond issue for maintenance and extension of water mains.

Spencer, N. C.—Waterworks bonds in sum of \$60,000 have been sold.

Piqua, O.—After investigation covering period of seven months, Morgan Engineering Co. and Dayton Floor Prevention Commission have decided upon tentative locations of various proposed reservoirs to be constructed in Miami Valley, as only comprehensive method of making impossible another disastrous flood.

Youngstown, O.—City Council has accepted report of finance committee, which provided for sale of \$200,000 bond issue for Milton reservoir dam to Hayden, Miller & Co. of Cleveland.

Baker, Ore.—Bond issue of \$54,000 has been authorized for replacing 3½ miles of old water mains.

Woonsocket, R. I.—Water Commissioners will consider proposition presented by village of Millville through committee in connection with installation of water mains in Millville. Committee wanted to know if city would be willing to extend water system from Blackstone to Millville at cost of about \$42,000. If not, would Woonsocket let Blackstone install system, village of Millville paying proportionate rental. Commissioners took matter under advisement.

Atlanta, Ga.—Following are bids received for Peachtree Creek Interceptor, Section 3—(A) Dysard Construction Co.; (B) M. F. Sullivan; (C) Nichols Contracting Co.; (D) Case & Gottrean; (E) Jordan & Stewart. Contract has been awarded to Dysard Const. Co., at total bid of \$10,204.50:

	(A)	(B)	(C)	(D)	(E)
100 cu. yds. earth exc. & back-filling, 10 ft. or under.....	\$0.65	\$2.50	\$3.00	\$0.75	\$0.50
1,200 cu. yds. earth exc. & back-filling, 15 ft. or under.....	.80	2.50	3.00	1.20	.50
1,000 cu. yds. earth exc. & back-filling, 20 ft. or under.....	1.25	2.50	3.00	1.75	.60
200 cu. yds. rock exc.....	3.00	5.00	5.00	3.45	2.00
50 cu. yds. embankment.....	.50	1.50	.50	.50	.25
1,000 ft. concrete sewer, Type A, in place, 48".....	5.50	6.00	4.75	7.00	4.35
900 ft. concrete sewer, Type B, in place, 48".....	5.75	6.00	5.15	7.50	4.70
1,900 ft. reinforced concrete sewer, in place, 48".....	....	....	5.90	6.00	....
1,900 ft. seg. block vitrified clay sewer, in place, 48".....	4.00	5.25	5.90	7.50	....
1,900 ft. lock joint sewer, in place.....	4.70	5.75	5.00	7.50	....
5,000 brick.....	20.00	25.00	20.00	16.00	15.00
50 cu. yds. concrete.....	7.00	12.00	10.00	9.00	10.00
3 manhole castings, Type A.....	10.00	10.00	15.00	7.00	12.00
10 manhole steps.....	.25	.30	.35	.30	.20
1,000 lumber B. M.....	22.00	35.00	40.00	20.00	20.00
100 cu. yds. crushed stone.....	3.00	2.50	3.00	3.00	2.00
500 lbs. reinforcing steel, in place.....	.05	.05	.05	.05	.05
Totals.....	\$2,604.50	\$5,643.00	\$6,238.50	\$3,304.00	\$1,993.00
Totals.....	\$13,279.50	\$17,943.00	\$15,623.50	\$17,054.00	\$10,573.00
Totals.....	\$10,204.50	\$15,618.00	\$17,448.50	\$14,704.00	.....
Totals.....	\$11,534.00	\$16,568.00	\$17,448.50	\$17,554.00	.....
Totals.....	.....	.....	\$15,738.50	\$17,554.00	.....

Fort Stockton, Tex.—Fort Stockton voters have petitioned City Council to call election to determine issuance of bonds to amount of \$50,000 for waterworks and sewer system.

Mincola, Tex.—Bond issue of \$25,000 has been voted for waterworks system.

Rockdale, Tex.—City Council has entered into contract with O'Neil Engg. Co. of Dallas to make figures for waterworks plant as follows: First, on the amount of money necessary to build and equip a water and light plant of equal capacity to the present plant of the Rockdale Water & Light Co.; second, on the amount necessary to add to that plant equipment sufficient to meet the needs of the city; third, on actual value of present plant, depreciation being taken into account; fourth, on the cost of an entirely new waterworks plant of sufficient capacity.

Rockadel, Tex.—Bonds in sum of \$27,000 have been voted for constructing water works.

Calgary, Alberta, Can.—City will shortly be in the market for water meters.

Cloverdale, B. C.—City Engineer is said to have estimated cost of water works at \$68,772.

CONTRACTS AWARDED.

Jacksonville, Fla.—To Epping-Carpenter Pump Co., of Pittsburgh, Pa., contract for a 12,000,000-gallon crank and flywheel pumping engine.

Bloomington, Ill.—For laying a 12-in. water main in Washington St. to P. F. McDonald at \$7,771. Elmer Folsom is City Engr.

Chicago, Ill.—For water supply pipes in various streets to Simon Ryan, Malachy Murphy, Edward Connor and Di Vito & Tirillini.

Princeton, Ill.—For drilling of a well 1,450 ft. deep, bids were as follows: S. B. Geiger, \$4,025; M. T. Peterson, \$4,950; W. H. Gray & Bro., \$4,027.50; W. H. Carter, \$3,284.50; J. P. Miller Well Co., \$3,235; J. R. Sewell, \$2,737.50; F. M. Gray, Jr., \$4,027.50. Contract was awarded to J. R. Sewell, of St. Louis.

Rock Island, Ill.—By Board of Local Improvement, for installing 12 blocks of water mains to P. F. Trenkenschuh, of Rock Island.

Lacrosse, Ind.—To J. G. Berger, Ft. Branch, Ind., by W. A. VanFrank, Division Engr. C. & E. I. R. R., Danville, Ill., for construction of 30,000-gal. reinforced concrete water tank at Lacrosse, base to be 16 ft. above top of rail, engine and pump under tank.

Hudson Mich.—To Robert H. Kersey, of South Bend, Ind., for sinking of test well, 71 ft. deep, with 8-in. galvanized pipe and a 15-ft. strainer, at \$394. If more wells are required the price will be \$350 per ft.

Lancaster, Mo.—To Derigo & Tadlock, contract for construction of a reservoir in City Park.

Silver Creek, Neb.—To Alamo Engine & Supply Co., 1122 Farnam St., Omaha, contract, at \$8,000, for waterworks plant for Silver Creek.

Trenton, N. J.—On recommendation of Johnson & Fuller, consulting engineers on new filtration plant, City Commission has voted to award contract for low lift pumping equipment to De Laval

Steam Turbine Co. The proposal accepted by commission was one of several submitted by De Laval Co., alternative bids having been asked, and amounts to \$42,500. Commission, by accepting bid, decides to generate power for pumps by means of turbines, cost of which is included in proposal.

Statesville, N. C.—City of Statesville has contracted with Laidlaw-Dunn-Gordon Co. of Cincinnati, O., for modern water pump with daily capacity of one million gallons, which will be installed at city water station. First cost of pump is \$4,100 and there will of necessity be considerable cost in its installation.

Barberton, O.—To Massillon Iron & Steel Co., for 14.61 tons of 8-in. and 203.60 tons of 6-in. cast iron pipe, at \$24.90 per ton, and 16.19 tons of 4-in. at \$26.90. The Ludlow Valve Co. received contract for furnishing 33 hydrants.

Columbus, O.—To National Concreting & Fire Proofing Co., Cleveland, at \$98,500, for installation of water supply system, including reservoir, pumping plant, mechanical equipment and water tank and tower, at State Hospital, Lima, O.

Frankfort, O.—The contract for the construction of a water plant and distributing system here has been awarded to Rosser, Harper & Stuart, Bremen, O., at \$13,775. Bids were received Nov. 14 by N. P. Wishart, Village Clk.

Lima, O.—Contract for reservoirs and water works system for Lima State Hospital involving expenditure of upwards of \$100,000, has been awarded to National Concrete Fireproofing Co., Cleveland, by Board of Trustees. Frank R. Stone, Lima, was given sub-contract for part of the work.

Plainview, Tex.—The contract for the extension of the water system has been awarded to Irick & Knuff, Plainview, at \$7,021.

Seattle, Wash.—To Will Kopta, 1422 27th Ave., Seattle, at \$8,584, for constructing water mains on 20th Ave. Northeast.

LIGHTING AND POWER

Berkeley, Cal.—Additional electric lights on various streets have been recommended.

St. Petersburg, Fla.—C. D. Hammond, Commissioner of Public Utilities, has issued statement to taxpayers in which he declares that municipality owned gas plant would cost \$145,000. In his statement he declares that 18 miles of mains would have to be laid. This would cost \$70,000.

St. Augustine, Fla.—Bond issue has been carried for lighting.

Moline, Ill.—City Comm. has approved of plans for installation of 111 new tungsten lamps at various street corners of city.

Sterling, Ill.—H. S. Green, who has been employed by city of Sterling to prepare specifications for new boulevard light system and assist in installation of same, has started to work on specifications. It is expected that same will be completed in a few days. As soon as possible ordinance will be drafted and sent to the council for action.

Indianapolis, Ind.—Change in street lighting is proposed by Henry W. Klausmann, city engineer, in specifications for new lighting contract he will submit to Board of Public Works for approval in next few days. He proposes to ask bids.

Indianapolis, Ind.—Bd. of Pub. Wks. has ordered Indianapolis Light & Heat Co. to install street arc lights at various points.

South Bend, Ind.—Ordinance for granting of municipal lighting contract is being considered.

South Bend, Ind.—Installation of municipal lighting plant is being discussed and planned.

Beaver Dam, Ky.—Plans are being considered for installation of municipal electric light plant.

Whitesburg, Ky.—The Council of Whitesburg has just advertised franchises for establishment of both electric lights and water works in the town.

South Manchester, Mass.—Plans are being considered for installation of ornamental street-lighting system in business district. Estimate cost is \$5,000.

Blair, Neb.—On Nov. 28 citizens will vote on \$35,000 to install municipal electric light plant.

Fort Hunter, N. Y.—Installation of lighting system is being discussed.

Lockport, N. Y.—Henry F. Thurston will begin drilling at once at Raymond Hill for natural gas supply for city of Lockport. He has notified Common Council that he accepts form of fran-